

SEQUENCE LISTING

<110> Ding, Jeak Ling

Lim, Eng Hwa

Lam, Toong Jin

National University of Singapore

<120> Recombinant Vitellogenin Enriched Feed

<130> 040184-000300US

<140> US 10/534,657

<141> 2005-05-10

<150> US 60/425,263

<151> 2002-11-12

<150> WO PCT/SG03/00266

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<170> PatentIn Ver. 2.1

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 Gln Phe Thr Ile Arg Val Lys Ser Pro Gly Arg Leu Gln Ala Lys Leu  
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 Glu Asn Pro Gln His Gly Asn Phe Asn Glu Gln Leu Pro Asp Pro Arg  
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 Glu Leu Pro Val Asp Leu Lys Tyr Gln Pro Thr Pro Asn Ile Asp Lys  
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 Val Phe Glu Ile Glu Ile Asp Gly Gly Arg Ile Val Ser Leu Asp Phe  
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 Pro Thr Ser Val Pro Val Pro Gln Glu Asn Leu Ile Lys Gly Leu Ile  
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 Ser Ala Leu Gln Leu Asp Thr Ser Ala His Arg Val Ile His Asp Ser  
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 Gln Asn Asn Tyr Asp Arg Glu Gln Gln Gln Gly Leu Phe Arg Lys Met  
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 Glu Thr Asp Val Thr Gly Asp Cys Glu Thr Leu Tyr Thr Val Ser Pro  
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 Val Ala Ser Glu Trp Arg Arg Glu Leu Pro Lys Phe Ala Asn Glu Gln  
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 Asp Pro Val Glu Val Thr Lys Ser Thr Asn Tyr Gly His Cys His His  
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 Arg Val Ala Tyr His Phe Gly Val Pro Val Gly Ala Glu Trp Thr Gly  
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 Thr Ala His Lys Thr Gln Glu Gln Gln Leu Ile Gly Arg Ala Thr Tyr  
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 Ser Arg Ile Leu Thr Gly Lys Glu Gly Pro Ile Tyr Lys Ala Glu Thr  
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 Thr Ser Thr Val His Val His Pro His Leu Tyr Gly Lys Gln Lys Ala  
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 Glu Val Tyr Ser His Val His Met Glu Leu Ile Ser Val Asp Gln Asp  
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Ile Leu Tyr Ser Leu Ser Thr Lys Gln Met Thr Lys His Tyr Glu Ser  
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 Ser Ser Ser Ser Ser Ser Glu Ser His Glu Phe Asn Phe Pro Glu  
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 Gln His Glu His Pro His Gln Ser Asn Gln Arg Ser Arg Arg Ser Tyr  
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 Met Arg Ser Lys Leu Val Thr Val His Lys Val Leu Lys Lys Arg Asn  
                   370                  375                  380  
  
 Ser Glu Ser Ser Ser Gly Ser Ser Ser Ser Ala Asp Ser Ser Ser  
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 Thr Tyr Ile Asn Asp Asp Ile Pro Asp Ile Asp Glu Pro Ala Tyr Ala  
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 Ala Leu Tyr Met Ser Pro Gln Pro His Ala Asp Lys Lys Gln Asn Ala  
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 Met Asn Ala Gln Lys Ile Leu Gln Asp Ile Ala Gln Gln Leu Gln Asn  
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 Pro Asn Asn Met Pro Lys Ser Asp Phe Leu Ser Lys Phe Asn Ile Leu  
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 Val Arg Leu Ile Ala Ser Met Ser Thr Glu Gln Leu Ser Gln Thr Ser  
                   465                  470                  475                  480  
  
 Arg Ser Ile Glu Thr Ala Lys Thr Ser Asn Asn Ile Ile Lys Ser Asp  
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 Met Trp Met Ile Phe Arg Asp Gly Val Thr Gln Ala Gly Thr Leu Pro  
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 Ala Phe Lys Gln Ile Gln Ser Trp Ile Glu Asn Lys Lys Ile Gln Glu  
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 Glu Glu Ala Ala Gln Val Val Val Ala Leu Pro Arg Thr Leu Arg Tyr  
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 Pro Thr Lys Gln Ile Met Thr Gln Phe Phe Asn Phe Ala Arg Ser Pro  
                   545                  550                  555                  560  
  
 Ala Val Lys Asp Gln Met Phe Leu Asn Ser Ser Ala Leu Met Ala Ala  
                   565                  570                  575  
  
 Thr Lys Leu Ile Asn Leu Gly Gln Val Asn Asn Tyr Thr Ala His Ser  
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 Tyr Tyr Pro Thr His Met Tyr Gly Arg Leu Thr His Lys His Asp Ala  
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 Thr Val Glu Tyr Lys Asp Ser Thr Lys Ala Gln Val Tyr Ile Gln Ala  
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 Leu Glu Gly Lys Val Glu Ile Ser Thr Tyr Leu Arg Thr His Ile Val  
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 Lys Asn Leu Lys Thr Leu Ala Lys Leu Arg Asp Arg His Val Arg Ala  
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 Val Leu Phe Ser Ile Leu Arg Asn Thr Ala Glu Pro Tyr Pro Val Arg  
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 Asp Ser Tyr Asp Glu Asp Asn Asp Ile Gly Thr Phe Val Ile Ser His  
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 Pro His Pro Lys Phe Asp Arg Ala His Lys Tyr Ser Ala Glu Lys Ile  
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Gly Lys Phe Ser Phe Pro Ser Lys Asp Asn Lys Tyr Tyr Glu Ala Asn  
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Met Ile Lys Asp Val Gln Phe Thr Tyr Ala Ile Asn Ile Asp Gly Asn  
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Val Gly Phe Met Asp Thr Leu Ser Asn Gln Tyr Ser Ser Val Gly Val  
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Val Asn Lys Leu Gln Phe Asn Ile Pro Phe Lys Phe Gly Ile Glu Ile  
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Lys Ser Gly Leu Ile Lys Phe Arg Val Glu Pro Leu His Pro Asp Gln  
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Asp Gln Thr Leu Val His Tyr Ser Val Trp Pro Tyr Ser Ala Ser Gln  
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Lys Lys Asp Ser Leu Val Ala Ile Ser Gln Asp Pro Ala Thr Lys Ile  
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Val Glu Arg Arg Ser Lys Val Phe Ser Val Asp Ser Lys Tyr Gly Gln  
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Ser Thr His Ala Val Ile Tyr Ala Gln Gly Tyr Thr Tyr Ser Ser Asp  
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Trp Arg Asn Phe Gly Ala Lys Phe Thr Ser Arg Asp Tyr Phe Thr Asn  
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Leu Lys His Leu Cys Lys Gln Ser Gln Ser Lys Ala Leu Thr Ile Thr  
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Ala Tyr Tyr Asp Glu Tyr Tyr Asn Gln Asn Ser Gly Ile Leu Thr  
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Asp Ala Thr Asp Arg Asn Asp Leu Ser Pro Asn Ser Glu Thr Arg Arg  
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Ala Glu Met Val Lys Leu Val Ser Ala Gly Ile Asn Lys Ala Arg Val  
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Arg Val Val Asp Leu Ser Ala Ser Phe Glu Gly Ser Gln Asp Gln Asn  
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Tyr Val Leu Thr Gly Thr Trp Gly Asp Ser Pro Val Asp Ser Lys Val  
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Gln Gly Met Leu Phe Ala Gly Thr Lys Ser Ala Thr Gln Gly Asn Gln  
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Gln Ile Asn Ala Val Phe Ala Thr Thr Lys Pro Glu Ile His Ser Leu  
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Ser Phe Ser Lys Pro Leu Gln Ser Asp Leu Arg Ala Pro Phe Gly Met  
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His Phe Lys Tyr Gly Gln Ser Gly Glu Ile Arg Val Ser Gly Ser Phe  
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 Lys Gln Cys Ser Gln Gln Thr Thr Leu Asn Asn Phe Tyr Gln Asp Ser  
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 Cys His Lys Ala Ile Val Met Ala His Ala Pro Asp His Val Glu Phe  
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 Phe Ser Tyr Phe Asp Arg Thr Tyr Thr Val Asp Ile Ala Ser Pro Ser  
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 Gly Glu Ala Arg Met Arg Asp Met Pro Ile Ala Thr Met Ala Pro Gly  
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 Ala Leu Ser Phe Tyr Gln Pro Leu Lys Ala Tyr Glu Leu Val Ala Asn  
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 Ser Trp His Val Val Met Gln Asp Glu Ser Thr Gln Arg Gly Asn Trp  
                   1475                  1480                  1485  
  
 His Glu Leu Ala Ile Leu Ser Arg Arg Gln Gln Arg Asp Gln Gln Glu  
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                   1505                  1510                  1515                  1520  
  
 Ile Gln Pro Ala Ser Gly Asp Ser Ala Tyr Gln Val Lys Val Thr Thr  
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 Asn Thr Lys Lys Ile Thr Asp Asp Asp Leu Thr Met Tyr Trp Asp Asp  
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 Val Lys Glu Gln Pro Phe Leu Gln Tyr His Thr His Lys Asp Gly Val  
                   1555                  1560                  1565  
  
 Leu Val Ile Asn Ile Glu Asp Asp Arg Ile Arg Ala Ile Tyr Asp Gly  
                   1570                  1575                  1580  
  
 Gln Arg Phe Val Val Phe Thr Gln Asp Tyr Arg Asn Ser Thr Arg Gly  
                   1585                  1590                  1595                  1600

Ile Cys Gly Arg Met Ser Gly Glu Gln Arg Asp Asp Tyr Leu Thr Pro  
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 Glu Gly Leu Val Asp Lys Pro Glu Leu Tyr Ala Ala Ala Tyr Ser Leu  
                   1620                  1625                  1630  
  
 Asn Glu Glu Asn Ser Asp Pro Lys Thr Gln Glu Leu Lys Ala Leu Ala  
                   1635                  1640                  1645  
  
 Thr Gln Gln Ala Tyr Tyr Pro Glu Tyr Lys Tyr Thr Ser Ile Leu Arg  
                   1650                  1655                  1660  
  
 Ser Asp Pro Thr Trp Gln Glu Glu Ser Gln Ser Cys Gly Glu Asp Gln  
                   1665                  1670                  1675                  1680  
  
 Trp Gln Ser Glu Thr Val Tyr Lys Ser Arg Ser Tyr Asp Lys His Lys  
                   1685                  1690                  1695  
  
 Gly Ala Cys Glu Val Arg Gln Gln Val Gln Phe Tyr Glu Asn His Gly  
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 Asp Ile Cys Ile Thr Thr Ser Arg Val Pro Ser Cys Gln Ser His Cys  
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 Arg Ala Gly Asp Tyr Lys Ile Gln His Val Gln Val Thr Cys Lys Ser  
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 Lys Leu Asp His Asp Phe Arg Met Tyr Lys Glu Gln Ile Lys Lys Gly  
                   1745                  1750                  1755                  1760  
  
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   20            25                  30

Gly Lys Gln Tyr Leu Tyr Glu Val Asn Ser His Thr Leu Ser His Phe  
   35            40                  45

Tyr Glu Gly Thr Ser Ser Gly Asn Ala Phe Lys Ala Asn Phe Ile Ile  
   50            55                  60

Arg Val Thr Ala Gln Gly Leu Leu Gln Ala Lys Leu Glu Glu Pro Arg  
   65            70                  75                  80

Arg Ala Gln Phe His Gln Lys Leu Asp Asn Lys Met Gln Ile Pro Ala  
                   85                     90                     95  
  
 Asp Leu Lys Tyr Thr Asn Val Val Asn Leu Asp Gln Pro Phe Glu Ile  
                   100                 105                     110  
  
 Ser Phe Asp Gly Gly Arg Ile Leu Ser Leu Arg Leu Pro Glu Val Leu  
                   115                 120                     125  
  
 Ser Val Ala Asn Glu Asn Leu Leu Lys Gly Leu Ile Ser Thr Leu Gln  
                   130                 135                     140  
  
 Val Asp Leu Thr Asn Tyr Arg Leu Val Asn Arg Ser Gln Asp Ser Tyr  
                   145                 150                     155                 160  
  
 Asp Lys Asn Ser Gln Gln Gly Leu Phe Ser Lys Phe Glu Thr Asp Val  
                   165                 170                     175  
  
 Thr Gly Asp Cys Glu Thr Val Tyr Ser Val Ser Pro Val Asn Ala Glu  
                   180                 185                     190  
  
 Trp Arg Arg Glu Val Pro His Phe Ala Ser Asp Ser Ala Pro Ile Gln  
                   195                 200                     205  
  
 Ile Thr Lys Ser Lys Asn Tyr Asn Arg Cys His Gln Cys Ile Ile Tyr  
                   210                 215                     220  
  
 Asn Phe Gly Val Pro Arg Gly Ala Leu Trp Thr Gly Ile Ala His Gly  
                   225                 230                     235                 240  
  
 Asn Thr Glu Lys Gln Phe Ile Ser His Thr Thr Val Ser Arg Ile Leu  
                   245                 250                     255  
  
 Val Gly His Gln Gly Ile Tyr Asn Thr Glu Thr Thr Ser Ser Val Asn  
                   260                 265                     270  
  
 Val His Pro His Ile His Gly Arg Gln Lys Ala Glu Val His Ser Tyr  
                   275                 280                     285  
  
 Ile Gln Met Arg Leu Lys Ser Ile Glu Glu Asn Pro Gly Thr Asn Trp  
                   290                 295                     300  
  
 Gln Lys Pro Glu Ala Thr Arg His Val Lys Ser Leu Leu His Ser Met  
                   305                 310                     315                 320  
  
 Leu Thr Lys Gln Val Gln Asn Ser Tyr Gln Ala Ser Ser Glu Ser Asn  
                   325                 330                     335  
  
 Glu Glu Thr Glu Gly Ser Thr Tyr Thr Ala Gln Gln Pro Tyr Glu Ala  
                   340                 345                     350  
  
 Tyr Asp Gly Cys Tyr Tyr Glu Ser Ser Ser Tyr Leu Asp Ser Ser Asn  
                   355                 360                     365  
  
 Phe Val Asn Asn Glu Gln Leu Lys Tyr Asn Val Pro Asp Tyr Ala Ala  
                   370                 375                     380  
  
 Ile Leu Leu His Thr Gln Pro His Val Asp Lys Lys Gln Asn Ala Met  
                   385                 390                     395                 400

Ser Ala Gln Lys Leu Leu Gln Asp Leu Ala Gln Gln Leu Gln Asn Pro  
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 Ser Thr Met Pro Gln Asn Glu Phe Leu Thr Lys Phe Asn Ile Leu Val  
                   420                  425                  430  
  
 Arg Leu Ile Ser Thr Met Thr Asp Gln Leu Ala Gln Phe Ser Arg  
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 Gly Ile Glu Val Gly Lys Ala Ser Asn Lys Ile Ala Lys Val Asp Met  
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 Trp Phe Ile Phe Arg Asp Ala Val Ile Gln Ala Gly Thr Gln Pro Ala  
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 Phe Gln Leu Ile Glu Thr Trp Ile Lys Thr Lys Lys Ile Gln Gly Phe  
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 Leu Ala Ala Glu Val Ile Ser Ser Leu Ala Lys Thr Leu Arg His Leu  
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 Thr Lys Asp Thr Met Lys Gln Phe Phe Glu Leu Ala Leu Cys Pro Glu  
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 Val Leu Glu Gln Lys Tyr Leu Asn Ser Ser Ala Leu Ile Ala Ala Ala  
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 Glu Phe Ile Arg Leu Gly Ser Ile Asp Tyr Glu His Ser Tyr Pro Tyr  
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 Tyr Pro Pro Tyr Val His Gly Arg Phe Pro Leu Lys Asn Asp Arg Phe  
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 Ile Ile Glu Asn Ile Leu Pro Arg Leu Ser Gln Leu Leu Lys Gln Ala  
                   580                  585                  590  
  
 Val Glu Gln Glu Asp Tyr Gly Lys Thr Leu Val Ile Val Lys Ala Ile  
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 Gly Thr Leu Gly His Arg Glu Ile Leu Lys Val Phe Thr Pro Tyr Leu  
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 Glu Gly Gln Ile Lys Val Ser Thr Tyr Leu Arg Val Gln Met Ile Leu  
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 Ala Leu Lys Pro Leu Ala Glu Gln Lys Asp Arg Tyr Val Arg Ser Ala  
                   645                  650                  655  
  
 Leu Phe Ser Ile Leu Met Asn Thr Ala Glu Pro Tyr Glu Val Arg Val  
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 Ala Ala Ala Met Ile Leu Phe Leu Asn Glu Pro Thr Thr Asp Met Leu  
                   675                  680                  685  
  
 Arg Val Met Ala Gln Leu Thr Asn Asp Asp Pro Ser Ile His Val Arg  
                   690                  695                  700  
  
 Ala Val Leu Lys Ser Ser Ile Glu Thr Ala Ala Thr Leu Glu Gly Pro  
                   705                  710                  715                  720

Lys Tyr Trp His Leu Ala Lys Ala Ala Gln Ser Val Lys Glu Leu Val  
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Thr Ser Glu Asp Phe Gly Tyr Ala Tyr Ser Ala Ala Trp Phe Phe Ala  
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Lys Asn Phe Asp Ser Glu Glu Val Thr Arg Tyr Arg Leu Ala Asn Tyr  
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Ile Gly Ser Asp Gly Ser Leu Ile Pro Asn Leu Phe Ser Leu Thr Trp  
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Asn Asn Arg Phe Tyr Gly Arg Gly Ala Glu Asn Thr Val Gly Phe Thr  
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Ser Ser Asn Val Gln Asp Ile Phe Asp Tyr Ile Lys Gln Leu Ile Leu  
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Gln Pro Arg Lys Ser Thr Thr Glu His Gln Phe Ser Ala Asp Lys Ile  
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Ala Lys Leu Leu Asn Ile Lys Gln Asp Pro Leu Gln Pro Ile Glu Ser  
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Ser Ile Tyr Tyr Lys Ile Phe Asp Lys Glu Phe Phe Trp Pro Leu Asp  
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Glu Leu Glu Asn Gly Val Gln Ser His Tyr Thr Lys Val Phe Tyr Ser  
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Lys Gln Val Ser Val Ile Phe Pro Ile Ala Thr Gly Glu Pro Phe Val  
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Phe Glu Tyr Lys Glu Pro Val Val His Leu Gln Thr Lys Leu Ser  
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Gly Lys Ile Asn Tyr Pro Pro Thr Ser Lys Asp Ile Ser Ser Asn Ile  
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Gln Thr Glu Ile Gln Phe Thr Phe Ala Arg Asn Met Glu Gly Ser Val  
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Gly Phe Ile Asp Thr Asn Thr Asn Gln Leu Ala Asn Ile Gly Val Val  
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Lys Lys Tyr Gln Ile Asn Leu Pro Val Lys Ile Asn Val Ile Gly Gln  
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Ser Gly Lys Phe Gln Val Lys Leu Glu Pro Leu His Thr Asp Gln Asp  
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Leu Ile Leu Leu His His Ser Val Trp Pro Tyr Ser Ala Tyr Gln Gln  
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Thr Asn Thr Thr Thr Pro Ser His Asp Leu Lys Thr Lys Leu Ile  
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Lys Arg Leu Lys Lys Val Ala Glu Met Asn Lys Glu Leu Gly Gln Gln  
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 Phe Asn Leu Leu Phe Lys Tyr His Gly Phe Ser Ser Ser Asn Thr Tyr  
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 Arg Asn Ala Gly Asp Phe Val Gln Asp Ala Leu Asp Phe Ser Asp Phe  
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 Met Ser Leu Asn Asp Leu Ala Glu Thr His Tyr Glu Phe Thr Tyr Ser  
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 Gly Lys Gln Ser Lys Thr Lys Ala Val Thr Phe Thr Ala Ala Tyr Asp  
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 Val Ser His Asn Leu Asn Ser Thr Gly Lys Phe Gly Glu Ala His Arg  
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 Phe Ser Asp Val Thr Pro Asn Ser Ala Pro Arg Arg Glu Glu Ile Val  
                   1140                  1145                  1150  
  
 Lys Arg Val Ser Ser Gly Ile Lys Thr Ala Thr Ala Arg Val Ile Asp  
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 Phe Ser Ala Ser Phe Glu Gly Leu Gln Lys Leu Glu Tyr Ala Val Thr  
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 Ala Ala Val Ala Gly Ser Met Val Asp Leu Lys Thr Gln Phe Ala Val  
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 Leu Gln Lys Pro Gln Met Ala Pro Leu Asp Phe His Lys Ala Leu Asn  
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 Ser Ala Val Lys Tyr Leu Ile Glu Ala Asp Val Thr Tyr Gly Glu Asn  
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 Ser Asn Ile Asn Phe Lys Gly His Thr Glu Arg Ser Gln Glu Tyr Ala  
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 Glu Gln Leu Lys Asn Ser Leu Trp Ala Asn Gln Cys Ala Gln Glu Asn  
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 Ala Gln Gln Asn Lys Phe Gln Leu Gly Cys His Asn Val Leu Ile Glu  
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 Ser His Ala Pro Asp Arg Phe Lys Ala Ser Ile Thr Tyr Lys His Ile  
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 Pro Ala Ala His Thr Ala Leu Leu Asp Ser Tyr Ile Gln Gly Leu Trp  
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 Ser Lys Gly Phe Glu Tyr Asn Pro Ser Lys Arg Leu Pro Val Gly Gln  
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 Ile Glu Leu Glu Ala Asn Ala Ser Tyr Val Asp Gln Thr Ala Asn Val  
                   1345                  1350                  1355                  1360

Ala Trp Thr Trp Trp Asn Gly Gln Val Arg Phe Asn Asn Leu Pro Asn  
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 Thr Tyr Ile Thr Pro Ala Leu Thr Thr Ala Tyr Gln Pro Ile Gly Ile  
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 Glu Pro Phe Cys Thr Val Asp Gly Thr Lys Val Lys Thr Phe Ser Asn  
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 Arg Asp Tyr Asn Val Thr Leu Pro Glu Ile Trp Thr Val Leu Met His  
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 Ala Gln Thr Asn Trp Glu Glu Leu Val Val Leu Ala Lys Arg Pro Asn  
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 Glu Ala Lys Ala Lys Arg Glu Ile Gly Lys Ile Gly Lys Leu Asp Leu  
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 Tyr Ile Ser His Lys Thr Ala Thr Gly Lys His Leu Glu Val Asn Ile  
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 Pro Tyr Ser Ala Ala Asn Asn Lys Ala Asn Val Lys Val Glu Thr Asn  
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 Ile Val Asp His Ser Gln His Phe Gly Ala Ala Phe Thr Leu Asp Leu  
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 Glu Lys Thr Asn Ser Gln Ile Gln Gln Trp Lys Lys Ile Ala Gln Glu  
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 Gln Lys Val Tyr Arg Ser Arg Ser Tyr Gln Lys Gln Arg Gly Pro Cys  
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 Gln Val Gln Asn Gln Val Gln Tyr His Glu Asn His Gly Glu Ile Cys  
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Ile Thr Thr Pro Ile Ser Ala Cys Gln Ser His Cys His Ser Ser  
1685 1690 1695

Asn Tyr Gln Val Gln Ala Val Gln Ala Val Cys Lys Gly Lys Lys Asp  
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Pro Glu Phe Arg Met Tyr Lys Asp Gln Ile His Gln Gly Gln Asn Pro  
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Gly Arg Thr Leu Ala Ala Leu His Gln Val Ala Asp Gln Tyr Thr Gly  
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Ile Ala Leu Lys Ala Gln Leu Lys Cys Gln Pro Lys Gly Ser Asp Ala  
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Leu Ser Cys Asn Ile Gln Arg Pro Gln Val Ala Glu Ile His Ala Gln  
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Leu Pro Gly Gly Trp Asp Ser Pro Leu Pro Glu Lys Lys Thr Asn Tyr  
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Gln Lys Phe Glu Leu Ser Glu Lys Pro Phe Glu Ile Lys Phe Lys Asn  
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Gly Val Ile Asp Asp Leu Val Val Glu Lys Ser Leu Pro Thr Trp Gln  
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Val Asn Ile Ile Lys Ser Ile Ala Ser Gln Leu Gln Val Asp Thr Gln  
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Gly Glu Asn Ala Met Lys Ser Arg Tyr Asn Gln Glu Pro Glu Gly Asp  
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Gln Ala Tyr Ala Thr Tyr Lys Ala Met Glu Asp Thr Val Thr Gly Glu  
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Cys Glu Val Leu Tyr Asp Ile Ser Pro Leu Pro Glu Tyr Val Leu Gln  
180 185 190

Thr Lys Pro Glu Leu Ala Pro Val Pro Gln Leu Lys Gly Ser Gly Gln  
 195 200 205

Ile Ile Asp Ile Val Lys Thr Ser Asn Phe Ser Asn Cys Glu Gln Arg  
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Met Gly Tyr His Phe Gly Ile Thr Gly Glu Thr Asp Trp Glu Ala Gly  
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Ser Asn Ser Met Gly Asp Phe Leu Ala Lys Ser Ser Val Ser Arg Val  
 245 250 255

Val Ile Ser Gly Ser Leu Asp Arg Tyr Thr Ile Gln Ser Ser Val Thr  
 260 265 270

Thr Asn Lys Ile Val Val Ser Pro Asn Leu Lys Tyr Ser Gln Lys Gly  
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Met Val Val Ser Arg Leu Asn Ile Thr Leu Asp Ser Val Asn Ala Ala  
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Ser Gly Ser Pro Arg Ser Pro Ser Glu Pro Glu Ser Thr Gly Asn Leu  
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Val Tyr Ser Tyr Asn Ser Pro Phe Glu Ala Asn Asn Lys Arg Arg Pro  
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His Asn Asn Asn Asp Asp Asp Ser Ser Ser Ser Ser Ser Ser Ser Ser  
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Ser Glu  
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Glu Asp Gln Gln Arg Gly Asn Ser Glu Asn Lys Asn Asn Asn Gln His  
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Gly His Arg Gln Ala Arg Ala Ala Asn Gln Arg Gly Gln Gly Asn Gln  
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Asp Ser Asp Ser  
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Ser Ser Asp Ser Ser Ser Ser Ser Ser Glu Ser Asp Ser Leu Ser  
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Ser Ser Glu Glu Tyr Trp Gln Ser Arg Pro Thr Leu Thr Asp Ala Pro  
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Glu Ala Pro Met Leu Pro Leu Phe Ile Gly Tyr Lys Gly Ser Ala Ala  
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Gln Gln Ser Ser Gln Val Asn Pro Val Ser Val Ala Lys Lys Leu Ala  
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Ser Gln Ile Gly Glu Glu Leu Gln Lys Pro Ser Asn Ile Pro Lys Gln  
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Asn Thr Leu Glu Lys Phe Ser His Leu Ala Ala Leu Leu Arg Thr Met  
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 Glu Tyr Met Asp Ala Phe Phe Glu Leu Ala Thr Ser Pro Glu Val Thr  
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 Val Arg Glu Ser Gln Val Asn Asn Ala Ser Ala His Gly Arg Tyr Pro  
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 Val His Ser Phe Gly Arg Leu Ser Pro Lys Asn Asn Pro Ala Val Gln  
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 Gly Gln Trp Ile Pro Tyr Ile Ala Lys Gln Leu Lys Ser Ala Ile Arg  
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 Val Gly His Pro Lys Met Leu Ser Val Phe Glu Pro Tyr Leu Glu Gly  
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 Gln Glu Asp Ser Ser Asp Phe Gln Arg Leu Ser Met Val Leu Ser Met  
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 Gly Asn Leu Ala Arg Leu Tyr Pro Lys Gln Ala Arg Ala Val Leu Tyr  
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 Lys Ile Tyr Gln Asn Thr Gly Glu Ala Tyr Gln Val Arg Thr Ala Ala  
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 Val Phe Gln Leu Met Arg Thr Asn Pro Pro Pro Ser Met Leu Gln Arg  
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 Met Ala Glu Phe Thr Asn Gln Asp Thr Ser Lys Gln Val Asn Ala Ala  
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 Val Lys Ser Ile Ile Glu Thr Ala Ala Lys Leu Asp Asp Ala Glu Leu  
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 Ala His Asn Ala Arg Ala Ala Arg Asp Leu Leu Ser Thr Lys Asn Met  
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 Gly Leu Gln Tyr Ser Arg Gly Trp Leu His Asp Tyr Thr Ser Glu Ala  
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Met Ser Ser Gly Tyr Gln Leu Asn Ser Tyr Trp Ile Gly Ser Glu Asp  
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 Gly Phe Gln Ser Pro Ala Ser Ile Tyr Gly Ala Met Val Ser Ser Val  
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 Asp Asp Leu Leu Asp Val Leu Tyr Asp Gln Phe Glu Asp Asn Asp Glu  
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 Gly Ser Phe Leu Phe Pro Ala Leu Gln Gly Asn Arg Phe Tyr Ala Phe  
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 Ser Ser Trp Pro Tyr Thr Ala Gln Lys Asp Ile Leu Ser Glu Lys Pro  
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 Tyr Met Lys Asn Val Ser Ala Arg Ala Tyr Gly Leu Ala Arg Tyr Phe  
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 Gly Tyr His Ser Ala Tyr Glu Asn Ile Val Asn Pro Gly Asn Gln Lys  
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 Arg Cys Glu Val Leu Tyr Asp Ile Asn Pro Leu Pro Glu Phe Val Leu  
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Gln Lys Arg Pro Glu Leu Val Pro Met Pro Asp Ile Arg Gly Asp Gly  
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 Glu Ile Ile Asp Ile Val Lys Thr Lys Asn Tyr Ser Asn Cys Glu Gln  
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 Ser Thr Asn Lys Val Ile Leu Ser Pro Asn Phe His Glu Asn Arg Lys  
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 Gly Met Val Ser Ser Arg Val Asn Val Thr Leu Val Lys Ile Gly Ala  
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 Pro Ser Thr Gly Asp Trp Ser Thr Pro Ala Asn Pro Glu Ser Thr Gly  
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 Asp Asp Ser Ser Ala Ser Asp Ser Ser Lys Ser Ala Lys Ser Leu Glu  
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 Ser Ile His Lys Thr Asp Glu Ile Glu Pro Ile Thr Met Ala Lys Thr  
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 Thr Met Ser Thr Gln Gln Ile Ala Glu Ala Glu Arg Asp Leu Tyr Gln  
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 Gly Thr Trp Ala Ala Phe Arg Asp Ala Val Ala Gln Ala Gly Thr Ala  
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Pro Ala Leu Val Thr Ile Thr Leu Trp Ile Lys Gln Lys Lys Ile Arg  
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 Gly Val Glu Ala Ala Ser Val Val Gly Val Leu Ala Lys Thr Ala Arg  
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 Thr Pro Thr Arg Glu Tyr Ile Asp Val Phe Phe Glu Leu Ala Thr Met  
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 Pro Glu Thr Ile His Glu Pro Phe Leu Asn Thr Thr Ala Leu Phe Thr  
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 Phe Ser Glu Leu Val Arg Tyr Ser Gln Met Asp Asn Pro Ser Ser His  
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 Thr Arg Tyr Pro Val His Thr Phe Gly Arg Phe Ser Asp Lys Ile Asn  
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 Ser Leu Gly Asn Ile Ala His Pro Lys Ile Leu Ala Val Phe Glu Pro  
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 Tyr Leu Glu Gly Lys Met Pro Ala Ser Thr Phe Gln Arg Leu Leu Met  
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 Val Ile Ser Leu Asn Lys Leu Ala Thr Leu Lys Pro Lys Leu Ala Arg  
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 Arg Cys Ala Ala Val Thr Ala Leu Met Ser Thr Asn Pro Pro Ala Ser  
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 Ser Phe Ile Ser Ser Asp Asp Ser Tyr Val Pro Glu Ala Leu Phe Val  
                   805                  810                  815  
  
 Lys Ala Arg Ala Ile Phe Gly Gly Phe Thr Phe Pro Arg Thr Ser Ala  
                   820                  825                  830

Gly Ala Met Val Ser Ser Ala Lys Asp Leu Leu Ser Ala Phe Glu Asp  
                   835                  840                  845  
  
 Ala Phe Lys Gly Glu Lys Thr Ser His Lys His Ser His Val Glu Phe  
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 Ser Pro Glu Asn Val Ala Lys Leu Leu Lys Ile Lys Ser Glu Pro Asn  
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 Glu Asp Val Glu Gly Ala Phe Met Leu Gln Ser Ala Tyr Asn Asn Lys  
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                   915                  920                  925  
  
 Arg Ile Glu Ser Tyr Glu Met Thr Met Ser Phe Pro Met Glu Ser Gly  
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 Phe Pro Phe Val Tyr Thr Met Lys Val Pro Ser Met Leu Lys Leu Ala  
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 Gly Ser Val Lys Gly Asp Ser Asn Glu Asp Ser Leu Asp Gly His Val  
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 His Leu Arg Ala Val Tyr Ser Val Gln Phe Gln Ser Lys Leu Gly Phe  
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 Val Thr Pro Phe Glu His Gln His Tyr Met Ala Gly Ile Asn Lys Asn  
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 Tyr Gln Ala Tyr Val Pro Leu Arg Val Asn Val Asn Tyr Glu Asp Ser  
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 Asp Lys Arg Val Thr Leu Lys Ile Gln Pro Ile Glu Gln Asn Glu Lys  
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 Phe Lys Leu Trp His His Ser Val Val Pro Phe Thr Ser Arg His Asp  
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 Ile Leu Lys Met Ser Pro Val Leu Lys Asp Lys Glu Thr Gln Lys Ile  
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 His Gly Val Lys Phe Thr Val Leu Ala Glu Ala Asp Asn Asp Asn Ser  
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 Pro Leu Asn Phe Glu Asp Ala Lys Trp Glu Arg Asn Pro Leu Thr Gln  
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 Phe Met Gln Pro Ser Lys Ser Ser Glu Gln Ser Ile Ile Leu Ser Thr  
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Ala Phe Glu Thr Leu Gln Asp Asp Thr Thr Lys Tyr Asp Glu Asp Arg  
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 Ser Lys His Ile Lys Ala Glu Ala Pro Lys Val Glu Asn Lys Lys Leu  
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 Lys Tyr Arg Asp Thr Ile Lys Arg Leu Pro Thr Ala Ile Glu Cys Ile  
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 Ser Val Lys Met Thr Met Leu Asp Lys Thr Arg Ile Thr Ile Lys Tyr  
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 Asp Lys Asp Ser Arg Glu Met Tyr Gln Leu Phe Asp Asp Tyr Leu Asp  
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 Ser Met Ser Asp Ala Asp Asp Leu Lys Ser Ser Lys Lys Arg Leu  
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 Ser Asp Phe Val Lys Leu Glu Ala Arg Asp Val Pro Ile Asn Gly Ile  
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 Gly Pro Leu Val Asn Val His Pro Asp Leu Glu Thr Ala Glu Arg Leu  
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Asp Ser His Ser Ala Thr Thr Phe Asp Glu Ser Thr Tyr Pro Ile Asn  
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 Leu Gly Lys Cys Trp His Val Val Met Thr Thr Phe Pro Lys Thr Asn  
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 Lys Asn Ser Gly Ser Ala Glu Pro Ile Asp Glu Asp Met Ala Leu Ser  
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 Ile Leu Val Arg Asp Ala Gly Asp Lys Lys Lys Asp Ile Lys Val Thr  
 1525 1530 1535  
  
 Leu Gly Asp Lys Glu Leu Gln Phe Ser His Ala Asp Ser Lys Asn Lys  
 1540 1545 1550  
  
 Val Thr Leu Asp Gly Lys Lys Val Asp Leu Ser Glu Lys Arg Ser Tyr  
 1555 1560 1565  
  
 Arg His Lys Asn Gly Lys Asp Ile Asp Phe Glu Val Leu Gln Arg Pro  
 1570 1575 1580  
  
 Asp Gly Thr Leu Gly Leu Val Ser Ser Lys Tyr Asp Ile Asp Ala Trp  
 1585 1590 1595 1600  
  
 Tyr Asp Gly Gln Arg Val Gln Ile Lys Ala Ser Gly Lys Tyr Arg Ser  
 1605 1610 1615  
  
 Asp Ile Arg Gly Leu Cys Gly Asn Phe Asp Gly Glu Pro Asp Asn Asp  
 1620 1625 1630  
  
 Phe Thr Ser Pro Lys Asp Cys Val Leu Leu Lys Pro Glu Glu Phe Ala  
 1635 1640 1645  
  
 Ala Ser Tyr Ala Leu Thr Thr Lys Asp Cys His Gly Ser Ala Leu Glu  
 1650 1655 1660  
  
 His Ala Arg Lys Ala Ser Gln Ala Val Cys Ser Gln Lys Ser Pro Arg  
 1665 1670 1675 1680  
  
 Pro Gly Asn Val Val Ser Asp Arg Asp Ala Gly Arg Lys Tyr Ser Glu  
 1685 1690 1695  
  
 Asn Ser Asn Trp Gly Tyr His Ser Arg Gln Asn Ser Asp Asp Glu Gln  
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 Gly Lys Asn Asp Ser Ser Asp His Lys Arg Cys Asn Thr Leu Arg Thr  
 1715 1720 1725  
  
 Lys Val Ile Glu Glu Glu Asp Gln Ile Cys Phe Ser Leu Arg Pro Leu  
 1730 1735 1740  
  
 Pro Thr Cys Ala Glu Gly Cys Thr Ala Asn Arg Thr Lys Pro Lys Val  
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 Met Pro Met His Cys Met Pro Lys Asn Ile Ala Ala Glu Arg Met Ala  
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Asp Arg Ile Lys Gln Gly Ala Asn Pro Asp Phe Ser Gln Lys Ser Tyr		
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Asp Asn Pro Trp Lys Ala Gly Thr Lys Tyr Thr Tyr Gln Ile Gln Gly		
20	25	30
Arg Thr Leu Thr Gly Leu His Gln Val Ala Asp Gln Tyr Thr Gly Val		
35	40	45
Met Ile Gln Gly Gln Leu Thr Val Arg Ala Glu Ser Asp Asn Lys Ala		
50	55	60
Thr Ala Val Ile Glu Asn Ala Lys Tyr Ala Asp Leu Gln Ala Asn Leu		
65	70	75
80		
Ser Arg Gly Trp Asp Ser Glu Ile Gln Glu Asn Glu Leu Gln Tyr Asn		
85	90	95
Glu Leu Pro Ile Ser Lys Asp Pro Phe Glu Ile His Phe Arg Asn Gly		
100	105	110
Val Ile Glu Lys Met Val Val Asn Lys Asp Ile Pro Gln Trp Gln Leu		
115	120	125
Asn Phe Tyr Lys Ser Ile Ala Ser Gln Phe Gln Val Asp Thr Gln Gly		
130	135	140
Lys Asn Leu Lys Asp Ser Lys Ile Asn Leu Val Pro Ser Gly Gln Ser		
145	150	155
160		
Gly Glu Pro Met Gly Val Tyr Lys Thr Met Glu Asp Ser Val Asn Gly		
165	170	175
Ile Tyr Glu Thr Leu Tyr Asp Ile Ser Val Leu Pro Glu Tyr Ile Leu		
180	185	190
Gln Ala Arg Pro Glu Leu Ala Pro Leu Pro His Leu Lys Gly Asp Gly		
195	200	205
Glu Phe Ile Glu Val Val Lys Thr Arg Asn Phe Ser Asn Ser Asn Gln		
210	215	220
His Val Ile Tyr Arg Phe Gly Ser Ser Gly His Glu Gly Trp Glu Ala		
225	230	235
240		

Gly Thr Asn Gln Met Gly Asp Phe Leu Ser Arg Ser Ser Gln Ser Arg  
                   245                  250                  255  
  
 Val Ile Leu Ser Gly Lys Leu Asn Arg Tyr Thr Ile Gln Ser Ala Val  
                   260                  265                  270  
  
 Thr Thr Glu Lys Val Leu Val Ala Pro His Val Tyr Asn Asn Gln Lys  
                   275                  280                  285  
  
 Gly Ile Val Val Ser Ser Met Asn Ile Thr Leu Gln Gln Ala Thr Gly  
                   290                  295                  300  
  
 Ser Gln Gly Ser Pro Gln Ser Val Ser Asn Pro Arg Glu Val Lys Ser  
                   305                  310                  315                  320  
  
 Leu Val Tyr Glu Tyr Glu Ser Gln Gly Asn Ser Glu Asn Leu Gln Ser  
                   325                  330                  335  
  
 Ser Gln Gln Ser Ser Gln Gln Ser Ser Ser Glu Glu Ser Ser Ser Ser  
                   340                  345                  350  
  
 Ser Ser Ser Ser Ser Ser Ser Glu Glu Asn Met Asn Ser Met  
                   355                  360                  365  
  
 Lys Thr Asn Gln Gln Met Lys Glu Asp Arg Ala Lys Arg Ile Arg Arg  
                   370                  375                  380  
  
 Ser Leu Glu Glu Gln Gln Ser Ser Ile Asn Arg Lys Gly Lys Asn Ala  
                   385                  390                  395                  400  
  
 Arg Ser Gln Ala Asp Ser  
                   405                  410                  415  
  
 Ser Ser Ser Ser Ser Ser Ser Asp Ser Ser Ser Ser Val Ser  
                   420                  425                  430  
  
 Ser Ser Glu Glu Asn Leu Pro Arg Gln Pro Arg Ser Ile Glu Gln Ala  
                   435                  440                  445  
  
 Pro Gly Ser Glu Leu Gln Ala Gly Tyr Tyr Met Gly Ser Met Gly Gln  
                   450                  455                  460  
  
 Gln Lys Gln Asn Val Pro Glu Gln Ile Lys Ser Leu Ala Lys Lys Val  
                   465                  470                  475                  480  
  
 Gly Gln Trp Val Gln Asn Pro Gly Gln Ile Pro Glu Glu Asn Arg Leu  
                   485                  490                  495  
  
 Pro Leu Phe Ser Met Leu Thr Arg Met Val Gln Asn Ala Asn Ser Gln  
                   500                  505                  510  
  
 Gln Leu Glu Gln Val Thr Gln Ser Leu Tyr His Gln Gln Ser Lys Asn  
                   515                  520                  525  
  
 Gln Gln Gln Ser Asp Ala Glu Arg Gln Gln Tyr Gln Ser Trp Ala Ala  
                   530                  535                  540  
  
 Phe Arg Asp Ala Val Ala Gln Ala Gly Thr Gly Pro Ala Leu Val Thr  
                   545                  550                  555                  560

Ile Lys Gln Trp Ile Gln Ser Lys Lys Val Gln Gly Glu Glu Ala Ala  
 565 570 575

Gln Leu Leu Ala Val Leu Pro Tyr Thr Ala Arg Tyr Pro Asn Thr Glu  
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Tyr Met Asn Tyr Phe Phe Asp Met Val Thr Ser Glu Glu Ile Gln Arg  
 595 600 605

Gln Arg Ser Leu Asn Thr Thr Ala Leu Phe Ala Phe Thr Glu Leu Ser  
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Arg Lys Ser Gln Val Asp Tyr Asp Val Ala His Asn Arg Tyr Pro Val  
 625 630 635 640

His Leu His Ala Lys Asn Ser Gln Glu His Arg Gln Ala Val Pro Gln  
 645 650 655

Lys Tyr Ile Pro Trp Leu Gln Glu Arg Leu Glu Arg Ala Val Ser Arg  
 660 665 670

Gly Asp Ser Ile Lys Ala Gln Val Tyr Ile Arg Ala Leu Gly Asn Thr  
 675 680 685

Ala His Pro Lys Ile Leu Ala Val Phe Glu Pro Tyr Leu Glu Gly Lys  
 690 695 700

Ser Gln Ile Ser Glu Phe Gln Arg Leu Ser Ile Ile Ala Ser Leu Asp  
 705 710 715 720

Glu Met Thr Arg Thr His Pro Asn Leu Ala Arg Asp Val Leu Tyr Arg  
 725 730 735

Ile Tyr Gln Asn Thr Ala Glu Lys Ser Glu Ile Arg Ala Ala Ala Val  
 740 745 750

Arg Gln Leu Met Arg Thr Asn Pro Pro Ala Gln Met Leu Gln Arg Met  
 755 760 765

Ala Asp Phe Thr Asn Tyr Asp His Ser His Gln Val Asn Ala Ala Val  
 770 775 780

Lys Ser Ala Ile Glu Ser Ala Ala Ala Cys Thr Asp Ser Ser Val Asp  
 785 790 795 800

Gln Gln Leu Val Asn Asn Ala Arg Ala Ala Ala Asn Tyr Leu Thr Pro  
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Lys Asn Tyr Gly Val Gln Tyr Ser Lys Thr His Leu Lys Ser His Asn  
 820 825 830

Val Glu Gly Gln Asn Leu Gln Tyr Gln Gln His Cys Ser Ser Ile Gln  
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Ser Gln Asp Ser Ser Leu Pro Ser Ser Leu Met Tyr Glu Val Gln Gln  
 850 855 860

Ser Val Gly Gly Tyr His Arg Asp Pro His Lys Phe Tyr Phe Met Thr  
 865 870 875 880

Ser Ser Ser Glu Gln Ala Ile Asn Leu Met Arg Gln Thr Ile Ala Gln  
                   885                  890                  895  
  
 Gln Ser Gly Ser Tyr Arg Lys Arg Trp Ser Arg Asn Gln His Gly Ser  
                   900                  905                  910  
  
 Glu Gln Ser Tyr Glu Asn Ile Leu Arg Ser Ile His Leu His Thr Asp  
                   915                  920                  925  
  
 Glu Pro Val Gln Val Glu Gly Asn Ile Leu Val Ser Gly Leu Gly Gly  
                   930                  935                  940  
  
 Lys Glu Phe Phe Thr Phe Asp Asn His Thr Ile Glu Gln Ile Pro Gln  
                   945                  950                  955                  960  
  
 Phe Phe Ser Asn Ile Asn Glu Lys Leu Gln Asp Lys Ser Tyr Val Gln  
                   965                  970                  975  
  
 His Thr Lys Tyr Tyr Asn Gln Tyr Ser Leu Glu Ile Gly Phe Pro Ser  
                   980                  985                  990  
  
 Ala Met Gly Leu Pro Phe Val Tyr His Leu Asp Val Pro Thr Leu Ala  
                   995                  1000                  1005  
  
 Ser Val Ser Gly Lys Trp Ser Gly Gln Val Glu Leu Gln Gln His Gln  
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 Lys Glu Gln Asn Glu Lys Tyr Ser Ile Pro Val Lys Gly Gln Val His  
                   1025                  1030                  1035                  1040  
  
 Gly Asp Phe Glu Phe Val Tyr Ser Ala Gln Lys Ser Gly Leu Met Gly  
                   1045                  1050                  1055  
  
 Phe Val Ala Pro Phe Ser Gln Asn Arg Tyr Ile Ala Gly Leu Glu Lys  
                   1060                  1065                  1070  
  
 Asn Ile His Ala Tyr Val Pro Val Gln Ala Lys Val Glu Tyr Asn Pro  
                   1075                  1080                  1085  
  
 Glu Glu Asn Lys Val Gln Ala Ser Leu Gln Pro Leu Ala Gln Gln Lys  
                   1090                  1095                  1100  
  
 Gln Glu Glu Gln Gln Val Phe Gln Tyr Ser Ser Asn Ala Tyr Thr Thr  
                   1105                  1110                  1115                  1120  
  
 Tyr Gln Lys Ser Ser Asp Leu Thr Pro Tyr Leu Gln Gly Glu Asn Thr  
                   1125                  1130                  1135  
  
 Gln Ala Val Tyr Ala Lys Ala Pro Arg Trp Tyr His Asn Thr Tyr Gly  
                   1140                  1145                  1150  
  
 Gln Ala Ala Thr Gly Tyr Ala Phe Asp Leu Ser Tyr Lys Thr Glu His  
                   1155                  1160                  1165  
  
 Asn Ser His Ser Trp Ala Ser Ile Tyr Asn Ala Leu Gln Cys His Asp  
                   1170                  1175                  1180  
  
 Tyr Ile Ser Ala Phe Leu Tyr Tyr Asp Thr Pro Gly Thr Ile Gln Asn  
                   1185                  1190                  1195                  1200

Asp Tyr Ile Ser Ile Lys Tyr Asn Pro Gln Lys Ser Ser Pro Gln Glu  
                   1205                  1210                  1215  
  
 Val Asn Val Ala Leu Ser Phe Ile Ser Asn Glu Tyr Gly Asn Lys Gly  
                   1220                  1225                  1230  
  
 Ala Arg Met Thr Ser Lys Phe Lys Lys Ala Asn Ile Arg Asp Arg Ser  
                   1235                  1240                  1245  
  
 Ala Ser Ser Ala Arg Asp Asn Leu Ala Val Pro Ser Ser Glu Gln Gln  
                   1250                  1255                  1260  
  
 Arg Glu Gln Glu Leu Leu Arg Asn Val Glu Ala Glu Ile Gln Asp Ala  
                   1265                  1270                  1275                  1280  
  
 Lys Ser His Leu Leu Asp Ala Ser Val Thr Phe Gly Gly Lys Asn Asn  
                   1285                  1290                  1295  
  
 Asn Ala Gly Tyr Ser Phe Thr Leu Ala His Ala Asn Ser Pro Val Ser  
                   1300                  1305                  1310  
  
 Glu Lys Ser Arg Val Leu Phe Tyr Tyr Asn Ala Gln Pro Val Ser Ser  
                   1315                  1320                  1325  
  
 Ser Glu Asn Thr Lys Pro Phe Gln Ala Ala Phe Gln Leu Asp Ile Lys  
                   1330                  1335                  1340  
  
 Asp Pro Gln Leu Pro Ala Phe Asn Tyr Gln Asp Ala Leu Asn Ala Asp  
                   1345                  1350                  1355                  1360  
  
 Ser Thr Ser Gln Val Gln Gly Lys Ile Asn Met Gly Glu Gln Leu Glu  
                   1365                  1370                  1375  
  
 Ser Gln Ile Thr Phe Lys Gly Lys Leu Glu Arg Thr Gln Glu Arg Lys  
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 Glu Tyr Leu Gln Gln His Pro Leu Ala Arg Ala Cys Glu Ser Gln Met  
                   1395                  1400                  1405  
  
 Gln Arg Arg Asn Tyr Ile Gln Pro Ala Cys Leu Asn Ala Thr Leu Gln  
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 Ala Asn Phe His Asn Arg Tyr Gln Phe Val Phe Asn Tyr Gln Asn Val  
                   1425                  1430                  1435                  1440  
  
 Pro Ala Gly Val Arg Arg Ala Phe His Ser Ala Tyr Ser Met Gly Arg  
                   1445                  1450                  1455  
  
 Tyr Ala Leu Tyr Gln Asn Asn Glu Glu Asn Ile Asn Thr Glu Gln Asn  
                   1460                  1465                  1470  
  
 Gln Glu Gly Gln Ile Gln Ile Gly Val Gln Phe Glu Glu Asn Leu Arg  
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 Ser Val Asn Leu Ser Ile Ala Ala Pro Gly Leu Ser Ser Asn Phe Ser  
                   1490                  1495                  1500  
  
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                   1505                  1510                  1515                  1520

Arg Tyr Asn Thr Tyr Gln Leu Leu Lys Ser Lys Leu Tyr Gln Thr Glu  
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 Gln Pro Gln Ala Thr Ala Val Ile Asp Gly Asn Lys Ala Thr Thr Phe  
 1540 1545 1550  
 Ser Asn Arg Thr Tyr Pro Ile Asp Leu Gly Asn Cys Tyr His Val Phe  
 1555 1560 1565  
 Ala Met Tyr Ala Pro Gln Gly Gln Gly Glu Asn Arg Gln His Glu Ser  
 1570 1575 1580  
 Ser Ile Ser Asn Ile Gln Gln Gly Tyr Ala Val Leu Val Lys Glu Thr  
 1585 1590 1595 1600  
 Asp Ser Glu His Lys Glu Val Lys Val Ile Leu Gly Ser Asp Val Ile  
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 Glu Leu Lys Ser Lys Ser Ser Gly Leu Ser Ile Gln Ala Asn Gly Gln  
 1620 1625 1630  
 Asn Ile His Ala Ser Glu Lys Gln Leu Thr Lys Trp Ser Asn Asn Asn  
 1635 1640 1645  
 Asn Tyr Leu Glu Ala Tyr Ala Arg Pro Asp Ala Val Val Leu Ser Leu  
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 Pro Gln Gln Gly Ile Glu Leu Thr Tyr Asp Gly Ala Arg Val Gln Leu  
 1665 1670 1675 1680  
 Ser Ala Ser Ser Ser Tyr Lys Gly Asn Val Arg Gly Leu Ala Gly Thr  
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 Phe Asp Gly Gln Glu Ala Asn Asp Phe Thr Thr Pro Asn Asn Arg Val  
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 Leu Arg Asn Pro Leu Gln Phe Ala Ala Thr Tyr Ala Leu Leu Asp Ser  
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 Glu Cys Gln Gly Pro Ala Val Gln Arg Gln Gln Ala Gln Gln Ser  
 1730 1735 1740  
 Pro Ser Tyr Glu Arg Arg Val Ile Leu Gly Asp Val Val Asn Glu Leu  
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 Glu Ala Gly Arg Gln Gln Gln Asn Asn Lys Ser Lys Lys Asn Lys  
 1765 1770 1775  
 Ala Asn Gly Ser Glu Glu Arg Met Lys Val Gln Gly Ser Ser Cys Ser  
 1780 1785 1790  
 Lys Leu Met Thr Gln Ile Val Glu Glu Asn Asp Lys Ser Cys Phe Ser  
 1795 1800 1805  
 Thr Thr Pro Gln Pro Ala Cys Ala Ser His Cys Arg Pro Thr Gly Lys  
 1810 1815 1820  
 Ile Gln Lys Ile Val Asp Phe His Cys Val Gln Ala Ser Ser Ser Ser  
 1825 1830 1835 1840

Arg Asn Trp Ala Gln Met Ile Lys Asn Gly Ala Asn Pro Asp Phe Ser  
                   1845                     1850                  1855  
  
 Ala Lys Glu Lys His Arg Gln Ile Leu Leu Gln Leu Pro Thr Gly Cys  
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Tyr Gln Tyr Glu Asn Ser Phe Lys Gly Tyr Asn Pro Gly Tyr Lys Gly  
   20              25                     30  
  
Tyr Asp Ala Gly Tyr Lys Gly Tyr Gly Tyr Asp Ala Gly Tyr Lys Tyr  
   35              40                    45  
  
Asn Asn Gln Gly Tyr Ser Tyr Lys Asn Gly Phe Glu Tyr Gly Tyr Gln  
   50              55                    60  
  
Asn Ala Tyr Gln Ala Ala Phe Tyr Lys His Arg Pro Asn Val Thr Glu  
   65              70                    75                    80  
  
Phe Glu Phe Ser Ser Trp Met Pro Asn Tyr Glu Tyr Val Tyr Asn Val  
   85              90                    95  
  
Thr Ser Lys Thr Met Thr Ala Leu Ala Glu Leu Asp Asp Gln Trp Thr  
   100             105                    110  
  
Gly Val Phe Thr Arg Ala Tyr Leu Val Ile Arg Pro Lys Ser Arg Asp  
   115             120                    125  
  
Tyr Val Val Ala Tyr Val Lys Gln Pro Glu Tyr Ala Val Phe Asn Glu  
   130             135                    140  
  
Arg Leu Pro His Gly Tyr Ala Thr Lys Phe Tyr His Asp Met Phe Lys  
   145             150                    155                  160  
  
Phe Gln Pro Met Pro Met Ser Ser Lys Pro Phe Gly Ile Arg Tyr His  
   165             170                    175  
  
Lys Gly Ala Ile Lys Gly Leu Tyr Val Glu Lys Thr Ile Pro Asn Asn  
   180             185                    190  
  
Glu Val Asn Ile Leu Lys Ala Trp Ile Ser Gln Leu Gln Val Asp Thr  
   195             200                    205  
  
Arg Gly Ala Asn Leu Met His Ser Ser Lys Pro Ile His Pro Ser Lys  
   210             215                    220

Asn Glu Trp Asn Gly His Tyr Lys Val Met Glu Pro Leu Val Thr Gly  
 225 230 235 240  
 Glu Cys Glu Thr His Tyr Asp Val Asn Leu Ile Pro Ala Tyr Met Ile  
 245 250 255  
 Gln Ala His Lys Gln Trp Val Pro Gln Gly Gln Leu Arg Gly Glu Asp  
 260 265 270  
 Asp Gln Phe Ile Gln Val Thr Lys Thr Gln Asn Phe Asp Arg Cys Asp  
 275 280 285  
 Gln Arg Met Gly Tyr His Phe Gly Phe Thr Gly Tyr Ser Asp Phe Arg  
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 Pro Asn Thr Asn Gln Met Gly Asn Val Ala Ser Lys Ser Leu Val Ser  
 305 310 315 320  
 Tyr Met Tyr Leu Thr Gly Asn Trp Tyr Asn Phe Thr Ile Gln Ser Ser  
 325 330 335  
 Ser Met Ile Asn Lys Val Ala Ile Ala Pro Ser Leu Val Asn Lys Glu  
 340 345 350  
 Pro Ala Leu Val Tyr Ala Gln Val Asn Met Thr Leu Asn Asp Val His  
 355 360 365  
 Pro Tyr Asp Lys Val Pro Met Gly Pro Ala Glu Asp Leu Lys Val Phe  
 370 375 380  
 Val Asp Leu Val Tyr Ser Tyr Asn Met Pro Ser Asp Lys Lys Asn Tyr  
 385 390 395 400  
 Val Arg Pro Gly Asn Glu Thr Ser Ser Ser Ser Ser Ser Ser Ser Ser  
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 Ser Ser Ser Ser Ser Glu Ser Ser Ser Ser Ser Ser Glu Ser Val  
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 Glu Asn Pro Lys Ile Ser Pro Val Glu Gln Tyr Lys Pro Leu Leu Asp  
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 Lys Val Glu Lys Arg Gly Asn Arg Tyr Arg Arg Asp Leu Asn Ala Ile  
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 Lys Glu Lys Lys Tyr Tyr Glu Ala Tyr Lys Met Asp Gln Tyr Arg Leu  
 465 470 475 480  
 His Arg Leu Asn Asp Thr Ser Asp Ser Ser Ser Asp Ser Ser  
 485 490 495  
 Ser Ser Ser Ser Glu Ser Lys Glu His Arg Asn Gly Thr Ser Ser  
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 Tyr Ser Glu Ser  
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 Ser Ser Tyr Ser Ser Ser Ser Ser Ser Ser Glu Ser Tyr Ser Ile  
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Ser Ser Glu Glu Tyr Tyr Tyr Gln Pro Thr Pro Ala Asn Phe Ser Tyr  
 545 550 555 560  
 Ala Pro Glu Ala Pro Phe Leu Pro Phe Phe Thr Gly Tyr Lys Gly Tyr  
 565 570 575  
 Asn Ile Phe Tyr Ala Arg Asn Val Asp Ala Ile Arg Ser Val Gly Lys  
 580 585 590  
 Leu Val Glu Glu Ile Ala Ser Asp Leu Glu Asn Pro Ser Asn Leu Pro  
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 Lys Ala Asn Thr Met Ser Lys Phe Asn Ile Leu Thr Arg Ala Ile Arg  
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 Ala Met Gly Tyr Glu Asp Ile Tyr Glu Leu Ala Gln Lys Tyr Phe Val  
 625 630 635 640  
 Ser Gln Lys Glu Arg Gln Val Ala Gln Phe Ser Asp Lys Lys Phe Ser  
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 Lys Arg Val Asp Ala Trp Val Thr Leu Arg Asp Ala Val Ala Glu Ala  
 660 665 670  
 Gly Thr Pro Ser Ala Phe Lys Leu Ile Phe Asp Phe Ile Lys Glu Lys  
 675 680 685  
 Lys Leu Arg Gly Tyr Glu Ala Ala Thr Val Ile Ala Ser Leu Ala Gln  
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 Ser Ile Arg Tyr Pro Thr Glu His Leu Leu His Glu Phe Phe Leu Leu  
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 Ser Ala Tyr Asn Tyr Tyr Pro Val Phe Ser Phe Gly Arg Leu Ala Asp  
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 Ala Asp Tyr Lys Ile Ile Glu His Lys Ile Val Pro Trp Phe Ala His  
 770 775 780  
 Gln Leu Arg Glu Ala Val Asn Glu Gly Asp Ser Val Lys Ile Gln Val  
 785 790 795 800  
 Tyr Ile Arg Ser Leu Gly Asn Leu Gly His Pro Gln Ile Leu Ser Val  
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 Phe Glu Pro Tyr Leu Glu Gly Thr Ile Gln Ile Thr Asp Phe Gln Arg  
 820 825 830  
 Leu Ala Ile Met Val Ala Leu Asp Asn Leu Val Ile Tyr Tyr Pro Ser  
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 Leu Ala Arg Ser Val Leu Tyr Arg Ala Tyr Gln Asn Thr Ala Asp Val  
 850 855 860

His Glu Val Arg Cys Ala Ala Val His Leu Leu Met Arg Thr Asp Pro  
 865 870 875 880

Pro Ala Asp Met Leu Gln Arg Met Ala Glu Phe Thr His His Asp Pro  
 885 890 895

Ser Leu Tyr Val Arg Ala Ala Val Lys Ser Ala Ile Glu Thr Ala Ala  
 900 905 910

Leu Ala Asp Asp Tyr Asp Glu Asp Ser Lys Leu Ala Leu Asn Ala Lys  
 915 920 925

Ala Ala Ile Asn Phe Leu Asn Pro Glu Asp Val Ser Ile Gln Tyr Ser  
 930 935 940

Phe Asn His Ile Arg Asp Tyr Ala Leu Glu Asn Leu Glu Leu Ser Tyr  
 945 950 955 960

Arg Leu His Tyr Gly Glu Ile Ala Ser Asn Asp His Arg Tyr Pro Ser  
 965 970 975

Gly Leu Phe Tyr His Leu Arg Gln Asn Phe Gly Gly Phe Lys Lys Tyr  
 980 985 990

Thr Ser Phe Tyr Tyr Leu Val Ser Ser Met Glu Ala Phe Phe Asp Ile  
 995 1000 1005

Phe Lys Lys Gln Tyr Asn Thr Lys Tyr Phe Ala Asp Tyr Tyr Lys Ser  
 1010 1015 1020

Ala Asp Tyr Ser Thr Asn Tyr Tyr Asn Phe Asp Lys Tyr Ser Lys Tyr  
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Tyr Lys Gln Tyr Tyr Ser Lys Asp Ser Glu Tyr Tyr Gln Lys Phe  
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Tyr Gly Gln Lys Lys Asp Tyr Tyr Asn Asp Lys Glu Pro Phe Lys Phe  
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Thr Ala Pro Arg Ile Ala Lys Leu Leu Asn Ile Asp Ala Glu Glu Ala  
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Glu Gln Leu Glu Gly Gln Leu Leu Phe Lys Leu Phe Asn Gly Tyr Phe  
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Phe Thr Ala Phe Asp Asn Gln Thr Ile Glu Asn Leu Pro His Lys Met  
 1105 1110 1115 1120

Arg His Leu Phe Glu Asn Leu Glu Asp Gly Tyr Ala Phe Asp Val Thr  
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Lys Phe Tyr Gln Gln Gln Asp Val Val Leu Ala Trp Pro Leu Ala Thr  
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Gly Phe Pro Phe Ile Tyr Thr Leu Lys Ala Pro Thr Val Phe Lys Phe  
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Glu Val Asp Ala Ser Ala Lys Thr His Pro Gln Val Tyr Lys Met Pro  
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Ala Gly His Pro Glu Thr Glu Asn Asp Asp Phe Phe Tyr Met Pro Gln  
 1185 1190 1195 1200  
  
 Ser Ile Asn Gly Ser Val Asp Val Asn Leu Leu Tyr His Arg Met Val  
 1205 1210 1215  
  
 Asp Ala Lys Val Gly Phe Val Thr Pro Phe Asp His Gln Arg Tyr Ile  
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 Ala Gly Tyr Gln Lys Lys Leu His Gly Tyr Leu Pro Phe Asn Val Glu  
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 Leu Gly Leu Asp Phe Val Lys Asp Glu Tyr Glu Phe Glu Phe Lys Phe  
 1250 1255 1260  
  
 Leu Glu Pro Lys Asp Asp His Leu Leu Phe His Met Ser Ser Trp Pro  
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 Tyr Thr Gly Tyr Lys Asp Ile Thr Asp Met Arg Pro Ile Ala Glu Asn  
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 Pro Asn Ala Lys Ile Val His Asp Asp Asn Gln Ser Thr Lys Thr Met  
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 Glu His Thr Phe Gly Gln Asp Met Thr Gly Val Ala Leu Arg Phe His  
 1315 1320 1325  
  
 Ala Lys Tyr Asp Phe Asp Leu Ile Asn Phe Gln Gln Phe Trp Ser Leu  
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 Ile Gln Lys Asn Asp Phe Val Ser Ala Val Asn Tyr Pro Phe Ala Tyr  
 1345 1350 1355 1360  
  
 Gln Pro Tyr Glu Tyr His Gln Phe Asn Leu Phe Tyr Asp Ser Gln Arg  
 1365 1370 1375  
  
 Thr His Ala Lys Ser Phe Lys Phe Tyr Ala Tyr Gln Lys Phe Gly Ala  
 1380 1385 1390  
  
 Pro Ser Phe Glu Glu Thr Gly Pro Lys His Pro Ala Asn Arg His Ser  
 1395 1400 1405  
  
 Tyr Ser Gly Asn Tyr Tyr Glu Ser Asn Tyr Ala Gln Pro Phe Val Tyr  
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 Ser Pro Gly Ser Gln Arg Arg Tyr Glu Gln Phe Phe Arg Asn Ala Ala  
 1425 1430 1435 1440  
  
 Ser Gly Ile Arg Asn Ser Phe Val Arg Tyr Tyr Asp Phe Gly Phe Glu  
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 Phe Tyr Ala Pro Gln Tyr Lys Ser Glu Phe Thr Phe Thr Ala Phe  
 1460 1465 1470  
  
 Ala Asp Ser Pro Val Asp Lys Thr Ser Arg Gln Leu Tyr Tyr Phe Tyr  
 1475 1480 1485  
  
 Ala Ser Pro Met Phe Pro Ser Gln Ser Tyr Phe Lys Asp Ile Pro Phe  
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Ser Gly Lys Gln Phe Gln Phe Cys Ala Thr Ala Thr Ser Glu Phe Pro  
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Arg Val Pro Tyr Leu Lys Phe Ser Asp Phe Asp Lys Tyr Tyr Gly Asp  
 1525 1530 1535

Ala Ser Gln Tyr Phe Asp Phe Leu Tyr Gly Glu Ser Cys Gln Gly Gly  
 1540 1545 1550

Ala His Ile Ala Val Lys Gly Lys Gln Lys Gln Thr Gly Lys Tyr Arg  
 1555 1560 1565

Glu Tyr Leu Arg Phe Ser Asp Val Ala Lys Ala Cys Lys Glu Gln Met  
 1570 1575 1580

Ala Asn Gly Tyr Tyr Gln Phe Glu Glu Cys Gln Gln Ala Ile Asp Gln  
 1585 1590 1595 1600

Ala Tyr Tyr Tyr Asp Phe Tyr Asp Tyr Ala Ile Glu Tyr Lys Asp Val  
 1605 1610 1615

Gly Ser Val Ala Lys Asn Leu Thr Asn Lys Phe Tyr Asn Tyr Phe Gln  
 1620 1625 1630

Tyr Ala Phe Tyr Pro Tyr Phe Glu Ser Asn Phe Phe Tyr His Gly Lys  
 1635 1640 1645

Ser Asn Tyr Ile Lys Ala Glu Phe Glu Phe Ala Pro Tyr Gly Asp Tyr  
 1650 1655 1660

Tyr Asn Ala Ser Phe Phe Gly Pro Ser Tyr Ala Phe Gln Val Gln Asn  
 1665 1670 1675 1680

Tyr Pro Val Phe Asn Asp Tyr Ser Thr Tyr Phe Pro Tyr Phe Phe Lys  
 1685 1690 1695

Tyr Thr Phe Phe Pro Arg Tyr Gln Pro Tyr Tyr Met His Arg Leu Pro  
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Ser His Lys Pro Arg Asn Arg Pro Tyr Tyr Glu Leu Ser Asn Tyr Glu  
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Gln Phe Ala Ile Phe Asp Arg Lys Pro Gln Tyr Pro Ser Cys Ser Phe  
 1730 1735 1740

Ser Asn Asp Tyr Phe Tyr Thr Phe Asp Asn Lys Lys Tyr Phe Tyr Asp  
 1745 1750 1755 1760

Met Gly Glu Cys Trp His Ala Val Met Tyr Thr Val Lys Pro Asp Tyr  
 1765 1770 1775

Asp Phe Tyr Ala Gln Gln Ser His Phe Tyr Asn Ser Asp Phe Glu Tyr  
 1780 1785 1790

Lys Tyr Lys Asn Gly Phe Glu Glu Tyr Glu Gln Phe Ala Ala Leu Ala  
 1795 1800 1805

Arg Arg Gly Ser Asp Asn Gln Leu Tyr Phe Lys Phe Leu Phe Gly Asp  
 1810 1815 1820

Asn Tyr Ile Glu Val Phe Pro Asn Asn Gly Gly Val Pro Phe Val Lys  
 1825 1830 1835 1840

Tyr Asn Gly Arg Pro Tyr Asp Ile Ser Lys Ser Asn Ile Ala His Phe  
 1845 1850 1855

Glu Tyr Lys Glu Gly Tyr Pro Ser Phe Pro Phe Phe Tyr Ala Phe Ala  
 1860 1865 1870

Tyr Pro Asn Lys Asp Leu Glu Val Ser Phe Phe Gly Gly Lys Leu Lys  
 1875 1880 1885

Phe Ala Thr Asp Gly Tyr Arg Ala Arg Phe Phe Ser Asp Tyr Ser Phe  
 1890 1895 1900

Tyr Asn Asn Phe Val Gly Leu Cys Gly Thr Asn Asn Gly Glu Tyr Phe  
 1905 1910 1915 1920

Asp Glu Phe Val Thr Pro Asp Gln Cys Tyr Met Arg Lys Pro Glu Phe  
 1925 1930 1935

Phe Ala Ala Ser Tyr Ala Ile Thr Gly Gln Asn Cys Thr Gly Pro Ala  
 1940 1945 1950

Lys Ala Phe Asn Tyr Ala Tyr Gln Gln Lys Ala Lys Gln Glu Cys Val  
 1955 1960 1965

Lys Arg Glu Val Tyr Tyr Gly Asp Ile Ile Tyr Asn Gln Glu Tyr Tyr  
 1970 1975 1980

His Pro Arg Tyr Arg Tyr Tyr Asn His Asn Val Glu Glu Ser Ser Ser  
 1985 1990 1995 2000

Ser Ser Ser Ser Ser Ser Asp Ser Ser Ser Ser Ser Ser Ser  
 2005 2010 2015

Glu Phe Ser Ser Leu Ser Arg Ser Gly Ser Ser Ser Ser Ser Ser  
 2020 2025 2030

Ser Glu Glu Gln Lys Glu Phe His Pro His Lys Gln Glu His Ser Met  
 2035 2040 2045

Lys Glu Cys Pro Val Gln His Gln His Gln Phe Phe Glu Gln Gly Asp  
 2050 2055 2060

Arg Ile Cys Phe Ser Leu Arg Pro Leu Pro Val Cys His Ser Lys Cys  
 2065 2070 2075 2080

Ala Ala Thr Glu Lys Ile Ser Lys Tyr Phe Asp Val His Cys Phe Glu  
 2085 2090 2095

Lys Asp Ser Thr Gln Ala Lys Lys Tyr Lys Ser Glu Ile Gly Arg Gly  
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Tyr Thr Pro Asp Phe Lys Ser Phe Ala Pro His Lys Thr Tyr Lys Phe  
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Asn Tyr Pro Lys Ser Cys Val Tyr Lys Ala Tyr  
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 <213> Anthonomus grandis

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 <223> boll weevil vitellogenin

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Ser Gly Val Phe Leu Glu Ala Lys Leu His Leu Ser Ile Arg Pro Asp  
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Gly Lys Leu Gln Gly Arg Ile Ser Glu Pro Lys Phe Ala Gln Ile Leu  
 65 70 75 80

Ser Gln Leu Pro Asp Gly Trp Lys Ser Glu Ile Pro Asp Ser Gln Ile  
 85 90 95

Ser Tyr Lys Gln Leu Gln Leu Ser Gln Lys Pro Phe Gln Leu Val Leu  
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Glu Asn Gly Leu Ile Lys Arg Leu Ile Val Glu Lys Asp Thr Leu Asn  
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Trp Glu Ala Asn Ile Ile Lys Ser Ile Val Ser Gln Phe Gln Met Asp  
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Leu Gln Gly Glu Asn Ala Leu Gln Asn Pro Thr Ser Ser Phe Pro Thr  
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Asn Glu Tyr Met Asp Ala Val Phe Lys Thr Met Glu Glu Thr Val Thr  
 165 170 175

Gly Lys Thr Glu Thr Ile Tyr Asp Ile His Arg Leu Pro Glu Tyr Leu  
 180 185 190

Val Gln Ser Gln Pro Trp Ile Ala Pro Gln Tyr Lys Leu Lys Gly Glu  
 195 200 205

Gly Asp Leu Ile Glu Val Ile Lys Ser Lys Asn Tyr Thr Asn Ala Arg  
 210 215 220

Asp Arg Pro Ser Tyr His Tyr Gly Phe Gly Glu Ile Glu Glu Ser Glu  
 225 230 235 240

Pro Thr Ala Asn Lys Met Gly Gln Phe Phe Ile Arg Gln Ser Asn Ser  
 245 250 255

Arg Ala Ile Leu Thr Gly Lys Pro Ser Arg Tyr Ile Ile Gln Ser Thr  
 260 265 270

Tyr Thr Val Asn Lys Ile Met Val Asn Pro Ile Leu Lys Asn Lys Glu  
 275 280 285  
 Met Gly Ser Ile Thr Ser Met Val Asn Val Thr Leu Leu Glu Ile Asn  
 290 295 300  
 Asn Gln Gln Gln Pro Glu Glu Leu Ser Asn Pro Leu Asp Ile Gly  
 305 310 315 320  
 Asn Leu Val Tyr Thr Tyr Gly Gln Pro Lys Asn Asn Gln Val His Ser  
 325 330 335  
 Lys Leu Asn Glu Asn Leu Met Glu Asp Ser Ser Ser Glu Glu Ser Ser  
 340 345 350  
 Glu Gln Glu Met Thr His Arg Arg Phe Arg Arg Ser Ala Asn Ser Leu  
 355 360 365  
 Thr Lys Gln Trp Arg Glu Ser Ser Glu Glu Trp Asn Gln Gln Gln  
 370 375 380  
 Gln Pro Arg Pro Gln Leu Thr Arg Ala Pro His Ser Pro Leu Leu Pro  
 385 390 395 400  
 Ser Met Val Gly Tyr His Gly Lys Ser Ile Lys Glu Asn Lys Asp Phe  
 405 410 415  
 Asp Ile Arg Gln Asn Val Glu Asn Leu Val Thr Glu Ile Ser Asp Glu  
 420 425 430  
 Ile Lys Gln Ser Glu Lys Thr Ile Ser Lys His Thr Leu Asp Lys Tyr  
 435 440 445  
 Thr Ile Leu Asn Thr Leu Val Arg Leu Met Asp Glu Asp Asp Ile Gln  
 450 455 460  
 Phe Val Ala Glu Gln Met Tyr Ser Gln Met Lys Asn Gly Gln Gln Arg  
 465 470 475 480  
 Tyr Thr Trp Ser Ile Phe Arg Asp Ser Val Ala Glu Ala Gly Thr Gly  
 485 490 495  
 Pro Ala Leu Leu Asn Ile Lys Lys Trp Ile Glu Thr Lys Lys Ile Gln  
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 Lys Thr Glu Ala Ala Gln Val Ile Gly Thr Leu Ala Gln Ser Thr Arg  
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 Phe Pro Thr Glu Glu Tyr Met Arg Lys Phe Phe Glu Leu Ala Thr Glu  
 530 535 540  
 Thr Gln Val Arg Gln Gln Glu Thr Leu Asn Gln Thr Cys Ile Leu Ser  
 545 550 555 560  
 Tyr Thr Asn Leu Val His Lys Val Tyr Ile Asn Arg Asn Glu Ser His  
 565 570 575  
 Asn Gln Phe Pro Val His Ala Phe Gly Ser Phe Tyr Thr Lys Lys Gly  
 580 585 590

Arg Glu Phe Val Lys Thr Thr Val Ile Pro His Leu Lys Gln Glu Leu  
 595 600 605

Glu Lys Ala Ile Ser Asn Ala Asp Asn Asn Lys Ile His Val Met Ile  
 610 615 620

Arg Ala Leu Gly Asn Ile Gly His Lys Ser Ile Leu Asn Val Phe Gln  
 625 630 635 640

Pro Tyr Phe Glu Gly Glu Lys Gln Val Ser Gln Phe Gln Arg Leu Met  
 645 650 655

Met Val Ala Cys Met Asp Arg Leu Ala Asp Cys Tyr Pro His Ile Ala  
 660 665 670

Arg Ser Val Phe Tyr Lys Ile Tyr Gln Asn Thr Ala Glu Leu Pro Glu  
 675 680 685

Ile Arg Val Val Ala Val His Gln Leu Ile Arg Ala Asn Pro Pro Val  
 690 695 700

Glu Met Leu Gln Arg Met Ala Gln Tyr Thr Asn Thr Asp Ser Gln Glu  
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Glu Val Asn Ala Ala Val Lys Ser Val Ile Glu Ser Ser Cys Lys Leu  
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Glu Ser Ser Lys His Ala Glu Leu Arg Lys Ala Ala Gln Ser Ala Arg  
 740 745 750

Pro Leu Leu Thr Lys Lys Gln Tyr Gly Met Glu Gln Ser Tyr Ile Asn  
 755 760 765

Leu Arg Asp Tyr Val Ala Glu Gln Met Gly Leu Glu Leu His Val Gln  
 770 775 780

Arg Thr Ser His Ser Ser Ala Glu Ser Ser Phe Pro Lys Ile Met Lys  
 785 790 795 800

Phe Gln Leu His Gln His Asn His Gly Met Lys Gln His Ile Leu Ser  
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Thr Gly Gly Met Ile Ser Ser Ile Arg Glu Leu Leu Asn Val Leu Tyr  
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Arg Gln Thr Glu Val Phe Gln Gln Glu Lys Ser Gln Arg Ser Gln Glu  
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Gln Gly Lys Asp Asn Glu Trp Ser Ser Ala Asn Ile Ala Arg Leu Met  
 850 855 860

Asn Tyr Glu Arg Asp Glu Arg Glu Gln Leu Glu Ala Ile Ile Tyr Ala  
 865 870 875 880

Gln Val Glu Asp Val Gln Lys Leu Trp Ser Phe Asp Asn Gln Thr Leu  
 885 890 895

Glu His Leu Pro Glu Val Ile Arg Gln Gln Glu Glu Ile Tyr Arg Gln  
 900 905 910

Gly Lys Asp Phe Ser Tyr Val Lys Leu Lys Gln Leu Asn Glu Met Ala  
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 Leu Ser Phe Pro Thr Glu Met Gly Leu Pro Phe Leu Tyr Thr Tyr Asp  
 930 935 940  
 Val Pro Val Leu Met Lys Val Glu Gly Lys Ile Arg Ala Leu Ala Asn  
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 Pro Ala Ile Ser Arg Asn Asn Lys Leu Thr Lys Pro Glu Gln Ile Ser  
 965 970 975  
 Thr Glu Ile Lys Ala Arg Val Thr Cys Thr Gly Lys Thr Gln Ser His  
 980 985 990  
 Leu Ser Phe Val Thr Pro Phe Asp His Gln Ile Tyr Met Ala Gly Tyr  
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 Asp Lys Asn Met Tyr Val Ser Ile Pro Val Asn Ala Arg Leu Glu Met  
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 Asp Val Lys Ser Lys Glu Ala Lys Ile Glu Phe Glu Val Glu Gln Gln  
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 Gln Gln Asp Ser Arg Leu Val His Ile Thr Ser Thr Pro Tyr Thr Ser  
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 Arg Ser Asp Val Met Ala Ile Ser Pro Val Ala Leu Arg Pro Asn Thr  
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 Tyr Val Ile Lys Ser His Arg Asn Asn His Arg Tyr Phe Asp Phe Asn  
 1075 1080 1085  
 Phe Gly Lys Lys Glu Thr Gly Leu Thr Phe Arg Gly Trp Gly His His  
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 Pro Glu Gln Ser Ile Gly Phe Asn Asp Leu Val Ser Met Trp Gln Ser  
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 Arg Gly Val Ala Gly Val Trp Glu Gln Leu Trp Asp Lys Cys Ser Thr  
 1125 1130 1135  
 Glu Tyr Ser Glu Ala Thr Ile Ser Phe Ile Pro Ser Gln Ser Thr Thr  
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 Arg Lys Ala Thr Phe Arg Ile Asn Val Asp Gln Lys Tyr Gln Lys Gln  
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 Pro Glu Thr Gln Ser Pro Glu Asp Leu Leu Thr Leu Asn Gln Leu Ser  
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 Ser Lys Leu Gln Lys Asp Glu Pro Lys Gln Arg Gln Gln Glu Ile Lys  
 1185 1190 1195 1200  
 Lys His Val Gly Ser Gly Ile Asn Ser Ala Leu Leu Ser Cys Ser Asp  
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 Ile Ser Leu Glu Phe Glu Gly Asp Lys Lys Tyr Glu His Val Val Gly  
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Phe Ala Val Ala Lys Ser Asn Ala Asp Pro Lys Ser Arg Val Met Phe  
 1235 1240 1245  
 Tyr Tyr Lys Asn Lys Asn Glu Asn Lys Gln Gly Ala Leu Glu Ile Arg  
 1250 1255 1260  
 Ser Glu Ile Pro Asn Thr Asn Gly Leu Asn Leu Asp Asp Ser Leu Asp  
 1265 1270 1275 1280  
 Thr Glu Pro Ser Thr Lys Tyr Asn Met Arg Leu Gln Tyr Gly Asn Ser  
 1285 1290 1295  
 Glu Asn Asp Ala Phe Glu Ile Ser Ala Gln Ala Gln Leu Ser Arg Ser  
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 Gln Glu Arg Lys Gln Tyr Leu Ile Asn Gln Asp Pro Leu Tyr His Val  
 1315 1320 1325  
 Cys Lys Glu Gln Met Gln Gln Lys Asn Phe Gln Leu Pro Ala Cys Gln  
 1330 1335 1340  
 Asn Met Thr Ile Lys Ala Asn Phe Leu Asp His Ile Lys Tyr Gln Val  
 1345 1350 1355 1360  
 Gln Tyr Gln Lys Leu Asn Trp Lys Leu Val Glu Thr Leu Glu Gly Met  
 1365 1370 1375  
 Phe Lys Gly Leu Arg Val Leu Tyr Tyr Pro Met Thr Glu Ile Lys Ser  
 1380 1385 1390  
 Ile Ser Ser Val Gly Gln Asn Val Val Glu Gly Glu Val Gln Phe Gln  
 1395 1400 1405  
 Pro Glu Asp Phe Arg Gln Val Asn Val Thr Val Arg Asn Thr Asp Glu  
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 Glu Thr Val Phe Phe Asn Ile Ser Leu Asn Asn Glu Leu Leu Arg Thr  
 1425 1430 1435 1440  
 Leu Leu Val Pro His Pro Val Phe His Ala Lys Cys Arg Phe Ala Gly  
 1445 1450 1455  
 Leu Met Gln Gly Gln Gln Asn Tyr Arg Pro Thr Cys Val Ile Asp Gln  
 1460 1465 1470  
 Thr Thr Ala Gln Thr Phe Ser Asn Lys Thr Tyr Ser Val Asn Leu Asp  
 1475 1480 1485  
 Lys Glu Pro Thr Val Val Met Gln Tyr Val Pro Lys Asp Ala Arg Val  
 1490 1495 1500  
 Asn Gly Gln Gln Ser Lys Ser Val Glu Gln Leu Leu Arg Glu Ser Ile  
 1505 1510 1515 1520  
 Glu Asn Tyr Val Val Leu Val Arg Gln Val Ala Ala Asn Gln Lys Glu  
 1525 1530 1535  
 Val Ile Ile Asn Leu Asn His Pro Arg Thr Gln Gly Lys Thr Val Lys  
 1540 1545 1550

Ile Glu Met Lys Pro Ser Glu Asp Arg Gln Lys Ser Ala Arg Asn Pro  
 1555 1560 1565  
  
 Ala Ala Lys Val Thr Ile Asp Gly Gln Glu Met His Phe Asp Asp Lys  
 1570 1575 1580  
  
 Gln Ile Ala Asp Lys Cys Asp Gly Tyr Val Gln Val Tyr Ala Leu Pro  
 1585 1590 1595 1600  
  
 Asn Gly Glu Val Lys Leu Glu Val Glu Asp Ala Phe Tyr Leu Ile Tyr  
 1605 1610 1615  
  
 Asp Gly Gln Arg Val Lys Val Thr Ala Thr Gly Asn Lys Leu Arg Asp  
 1620 1625 1630  
  
 Ser Val Tyr Gly Leu Cys Gly Arg Phe Ser Gln Asp Lys His Glu Asp  
 1635 1640 1645  
  
 Phe Thr Val Pro Ser Asn Cys Val Thr Arg Asp Thr Arg Lys Phe Val  
 1650 1655 1660  
  
 Glu Ser Tyr Gln Val Glu Lys Gly Gln Gln Trp Arg Asn Ser Pro Ser  
 1665 1670 1675 1680  
  
 Glu Gln Cys Ile Lys Lys Val Leu Pro Leu Tyr Thr Asn Val Ile Ser  
 1685 1690 1695  
  
 Asn Gln Asn Gly Ser Gln Met Arg Thr Lys Leu Ala Ser Gly Thr Val  
 1700 1705 1710  
  
 Met Lys His Arg Tyr Ile Glu Glu Asn Gly Glu Ile Cys Phe Thr Ile  
 1715 1720 1725  
  
 Arg Pro Leu Pro Val Cys Asn Thr Ser Val Lys Gln Val Val Thr Lys  
 1730 1735 1740  
  
 Asn Val Pro Val His Cys Ile Gln Gly Thr Lys Thr Ala Tyr Tyr Tyr  
 1745 1750 1755 1760  
  
 Lys Ser Leu Ile Asp Gln Gly Asn Pro Asp Phe Ser Arg Lys Ser  
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 Glu Thr Arg Thr Ala Arg Met Glu Val Ala Ala Gln Cys Asn  
 1780 1785 1790

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 <223> German cockroach vitellogenin

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Val	His	Gly	Arg	Thr	Phe	Ser	Ser	Leu	Phe	Gln	Val	Ala	Asn	Gln	Tyr
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Thr	Gly	Ile	Leu	Tyr	Lys	Ala	Arg	Leu	Ser	Leu	Asp	Arg	Asn	Glu	Asp
50					55					60					
Gln	Leu	Ile	Thr	Gly	Lys	Val	Thr	Glu	Ala	Gln	Phe	Ser	Pro	Val	Asn
65					70			75					80		
Thr	Gln	Phe	Ser	Ser	Gly	Trp	Asp	Glu	Ser	Val	Pro	Asp	Glu	Lys	Leu
		85						90					95		
His	Trp	Asp	Val	Val	Pro	Met	Ser	Gln	Gln	Pro	Phe	Gln	Ile	Glu	Leu
			100				105					110			
Asn	Ser	Arg	Gly	Glu	Val	Arg	Lys	Leu	Arg	Val	Asn	Lys	Phe	Val	Glu
		115				120					125				
Leu	Trp	Glu	Ile	Asn	Met	Ile	Lys	Ala	Ile	Ile	Ser	Gln	Leu	Gln	Val
			130			135					140				
Val	Val	Asp	Glu	Asp	Lys	Lys	Val	Tyr	Arg	Val	Phe	Glu	Ser	Thr	Val
		145			150				155				160		
Thr	Gly	Arg	Cys	Glu	Ala	Leu	Tyr	Glu	Val	Asp	His	Leu	Tyr	Pro	Thr
			165				170				175				
Thr	Tyr	Leu	Asn	Pro	Trp	Gln	Trp	Thr	Gln	Gln	His	Asp	Thr	Lys	Leu
			180			185					190				
Arg	Ile	Met	Lys	Thr	His	Gln	Phe	Thr	Asn	Cys	Arg	His	Asn	Ser	Ala
		195				200				205					
Tyr	Lys	Leu	His	Phe	Asn	Ala	Phe	Glu	Tyr	Phe	His	Leu	Lys	Gln	His
		210			215				220						
Lys	Pro	Glu	Thr	Phe	Leu	Ser	Asn	Ser	Ala	Val	Ser	Arg	Val	Ile	Ala
		225			230				235			240			
Asp	Gly	Asp	Asn	Leu	Lys	Asn	Phe	Thr	Phe	Tyr	Ser	Gly	Glu	Thr	Ile
			245			250				255					
His	Lys	Ile	Val	Leu	Asn	Pro	Glu	Ile	Tyr	Asn	Lys	Gln	Lys	Gly	Met
			260			265				270					
Leu	Val	Ser	His	Ile	Asn	Val	Thr	Val	Glu	Arg	Lys	Gly	Arg	Glu	Leu
			275			280				285					
Thr	Val	Ile	Asp	Tyr	Glu	Leu	Arg	Asn	Val	Gly	Asp	Leu	Ser	Tyr	Ser
			290			295				300					
Thr	Ser	Leu	Val	Lys	Ala	His	Ser	Met	Arg	Asn	Ser	Ala	Ser	Met	Asp
		305			310				315			320			
Leu	Ser	Ser	Ser	Ser	Met	Ser									
			325			330				335					
Ser	Glu	Glu	His												
			340			345				350					

His Ser His Asn Gln Lys Leu Ser Lys Lys Arg Gln Val Pro Leu Pro  
 355 360 365  
 Arg Pro Leu Phe Glu Ala Asn Phe Asp Ala Ser Ser Gly Leu Thr Thr  
 370 375 380  
 Glu Gln Pro Val Thr Phe Arg Pro Arg Arg Gln Leu Phe Gln Gly Gln  
 385 390 395 400  
 Asp Met Ser Glu Glu Glu Thr Glu Gln Asn Pro Glu Ile Ile Pro Ala  
 405 410 415  
 Asn Leu Leu Pro Thr Tyr Asn Leu Ile His Asn Thr Lys Gln Val Asp  
 420 425 430  
 Val Asp Pro Val Gly Val Ala Val Arg Leu Ser Lys Asp Ile Ala Ala  
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 Asp Leu Gln Gly Glu Pro Arg Val Gly Glu Asp Arg His Ile Leu Pro  
 450 455 460  
 Arg Phe Thr Ile Leu Val Arg Leu Leu Lys Gln Leu Lys Val Ser Gln  
 465 470 475 480  
 Ile Met Glu Ala Ala Arg Lys Leu Tyr Lys Leu Glu Asn Asp His Pro  
 485 490 495  
 Asn Tyr Met Asn Trp Asp Thr Trp Arg Val Tyr Arg Asp Ala Val Ser  
 500 505 510  
 Gln Ala Gly Thr Trp Ser Ala Leu Asn Ser Ile Gln Gln Phe Ile Ser  
 515 520 525  
 Ser Glu Met Val Glu Pro Lys Glu Ala Ser His Leu Ile Thr Val Leu  
 530 535 540  
 Pro Ala Ala Val Ser Asp Lys Asn Lys Ala Tyr Leu His Phe Leu Phe  
 545 550 555 560  
 Glu Met Thr Lys Asp Pro Val Phe Lys Asn Met Thr Tyr Val Asn Thr  
 565 570 575  
 Ser Leu Val Leu Ala Phe Ser Glu Val Ile His Gln Val Glu Met His  
 580 585 590  
 Gln Val Arg Asp Leu Lys Ile Lys Ser Val Tyr Ile Pro Tyr Leu Val  
 595 600 605  
 Gln Glu Phe Asp Asp Ala Val Lys Glu Asn Asn Ser Ile Lys Ile Gln  
 610 615 620  
 Leu Tyr Thr His Ala Leu Gly Val Thr Gly Asn Thr His Ile Leu His  
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 Tyr Leu Arg Pro Tyr Ile Ile Gln Leu Lys Thr Ile Thr His His Gln  
 645 650 655  
 Arg Leu Phe Met Val Gln Ser Leu Glu Arg Val Val Glu His Asn Pro  
 660 665 670

Arg Lys Val Ile Asp Leu Leu Leu Ser Leu Tyr Leu Asp Gln Asn Glu  
 675 680 685

His Ala Asp Ile Arg Val Glu Ala Leu Phe Leu Leu Met Lys Ala Asp  
 690 695 700

Pro Ser Ile His Val Leu Lys Met Val Ala Glu Leu Thr His Thr Glu  
 705 710 715 720

Ser Asn Asn Gln Val Leu Ser Ala Ser Gln Ser Ala Ile Lys Ser Ala  
 725 730 735

Ala Asn Val Glu Gly Asp Ile Tyr Ser Glu Met Arg Arg Lys Ala Lys  
 740 745 750

Ala Val Glu His Leu Leu Ser Thr Arg Asn Met Asp Val Ser Tyr Ser  
 755 760 765

Lys Ser Tyr Leu Tyr Gly Tyr Lys Ser Lys Lys Ile Asn Tyr Asp Ser  
 770 775 780

Leu Tyr Asn Leu Asn Tyr Ile Gly Ser Glu Asp Ser Ile Tyr Pro Lys  
 785 790 795 800

Ser Met Leu Leu Asn Ile Phe Thr Asn Asn Leu Gly Arg Ile Asn Thr  
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His Val Gln Lys Gly Tyr Met Val Ser Ser Met Thr Asp Leu Trp Glu  
 820 825 830

Ala Phe His Thr Ile Tyr Lys Lys Asp Asn Gly Ser Pro Thr Asp Pro  
 835 840 845

Lys Thr Leu Val Lys Phe Val Glu Gly Asn Leu Lys Tyr Phe Asn Met  
 850 855 860

Gly Val Gln Lys Phe Trp Ala Phe Asp Asn Thr Thr Phe Ser Asn Ala  
 865 870 875 880

Ser Ala Val Ile Gln Glu Phe Leu Lys Thr Tyr Lys Lys Pro Thr Asn  
 885 890 895

Phe Asn His Thr Lys Leu Ser Ser Ser Ser Ile Thr Leu Thr Leu  
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Pro Cys Ala Met Gly Leu Pro Ala Tyr Phe Lys Met Asn Ser Pro Ser  
 915 920 925

Leu Trp Lys Tyr Asn Gly Glu Phe Ser Ile Gln Thr Asp Ala Lys Thr  
 930 935 940

Asp Val Pro Met Ser Leu Glu Asn Phe Met Asn Ile Thr Gly Ser Ile  
 945 950 955 960

Asn Leu Met Phe Ser Gln Met Tyr His Ala Gln Leu Ala Phe Ser Thr  
 965 970 975

Ala Phe Asp Asn Lys Glu Tyr Ile Ser Gly Leu Asp Arg Lys Val Glu  
 980 985 990

Val His Val Pro Val Lys Phe Gln Ile Asn Leu Asp Phe Lys Asn His  
 995 1000 1005  
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 Val Leu Gln Trp Gln Thr Ile Pro Tyr Thr Ile His Asn Val Pro  
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 Asp Phe Glu Thr Val Tyr Met Asp Gln Leu Phe Lys Leu Ile His Val  
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 Arg Lys Thr Ala His Phe Glu Lys Lys Met Gly Glu Asn Thr Gly Ile  
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 Val Phe Lys Val Lys Tyr Asp Thr Asp Gln Glu Phe Leu Asp Thr Lys  
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 Trp Phe Leu Asp Glu Phe Lys Val Leu Gln Leu Phe Thr Gly Leu Asn  
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 Tyr Asp Val Pro Thr Lys Asp Ile Phe Tyr Asn Asn Leu Thr Val Tyr  
 1105 1110 1115 1120  
 Tyr Asp His Glu Asp Thr Lys Asn His Ala Val Ser Phe Thr Val Thr  
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 Lys Glu Gln Ser Lys Phe Tyr Glu Thr Leu Asn Pro Val Val Gln Gln  
 1140 1145 1150  
 Asn Leu Lys Leu Ser Ser Gly Lys Lys Gln Lys His Arg Asn Val Lys  
 1155 1160 1165  
 Ser His Arg Ile Arg Arg Glu Tyr Thr Glu Asp Glu Asn Pro Ala Ile  
 1170 1175 1180  
 Pro Lys Asp Lys Gln Pro Asn Ser His Pro Arg Arg Gln Glu Tyr Leu  
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 Met Thr Leu Lys Phe Glu Gly Pro Ala Glu Ser Tyr Phe Thr Thr Thr  
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 Val Ser His Ala Thr Ser Leu Val Asn Gly Ser Ser Asn Tyr Leu Leu  
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 Phe Tyr Asp Gln His Tyr Tyr Glu Glu Lys Lys Arg Asn Gln Phe Cys  
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 Leu Ser Trp Ser Val Tyr Lys Pro Gln Val Pro Ile Met Asn Ile Tyr  
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 Ser Ala Phe Glu Phe Asp Pro Asn Ser Lys Val His Ala Ile Met Asn  
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 Ile Gly Lys Glu Cys Glu Asn Gly Gly Ser Ala Val Ala Asn Ile Asp  
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Met Leu Arg Leu Ser Glu His Leu Asp Tyr Val Lys Asn Leu Thr Val  
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 Ser Lys Leu Cys Asp His Glu Met Arg Thr Lys Arg Asp His Val Leu  
     1330                         1335                         1340  
  
 Pro Ala Cys Arg Asn Ser Thr Glu Arg Ala Ser Asp Leu Asn Arg Val  
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 His Val Asp Ile Asn Tyr Asn Leu Lys Gln His Glu Thr Phe Lys Arg  
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 Arg Val Tyr Lys Val Tyr Asp Phe Val Arg Thr His Leu Tyr Pro His  
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 Val Ser Glu Asp Val Ile Val Asp Asn Pro Ala Gln Phe Ile Ser Ala  
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 Asn Phe Thr Leu Lys Asp Asn Thr Arg Ala Phe Asn Val Ser Ile Glu  
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 Gln Ser Glu Met Leu Arg Met Asn Pro Arg Thr Ser Phe Ala Lys Arg  
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 Phe Ala Lys Trp Ala Leu Pro Leu Tyr Tyr Lys Pro Thr Cys Val Val  
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 Asp Ser Ser Tyr Ile Asn Thr Phe Asp Asn Phe Thr Tyr Ser Ala His  
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 Ile Glu Leu Lys Pro Asn Gln Gly Met Pro Glu Val Tyr Val Glu Gly  
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 Lys Arg Val Asp Tyr Asn His His Ser Thr Asp Leu Asn Val Ser  
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 Gln Asp Arg Ile Gly Tyr Val Tyr Ala Leu Pro Thr Lys Ala Ala His  
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 Cys Gly Asn Met Asp Gly Glu Phe Val Asn Asp Val Leu Thr Pro Trp  
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Gly Cys Tyr Ala Lys Asp Met Ala Leu Phe Val Ala Ser Tyr Ala Asp  
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 Asn Ser Asn Ser Glu Val Arg Lys Ile Lys Ala Thr Gln Asn Glu Gln  
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 Thr Cys Val Pro Gln Phe His Gln Pro Leu Val Ser His Gln Met Arg  
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 Leu Ser Gln Val Ile Lys Leu Ala Asp Thr Ser Ser Ser Glu Ser  
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 Ser Ser Ser Ser Glu Ser His Glu Asn Asn Ser Ser Pro Ser Ser Glu  
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 Ser Gln Val Asn Lys Ser Lys Arg Gln Pro Asn Ser Arg Pro Arg Ser  
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 Gln Pro Arg His Thr Tyr Tyr Glu Asn Gln Phe Cys Val Ser Glu Lys  
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 Pro Leu Asp Thr Cys Met Pro Leu Ile Cys His Ala Thr Glu Ser Tyr  
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 Thr Ile Asp Val Asn Phe Tyr Cys Val Pro Leu Gly Pro Ala Ala Asn  
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 His Tyr Met Lys Leu Val Lys Lys Gly Ile Leu Pro Asp Leu Ser Arg  
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 Cys Glu Pro Val Leu Asn  
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 Thr Tyr Gln Tyr Ser Gly Lys Ser Arg Val Gln Leu Lys Gly Val Asp  
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 Asp Asp Glu Pro Trp Ala Ile Asn Leu Lys Lys Gly Val Ala Ser Ala  
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 Glu Thr Glu Gly Glu Lys Val Ile Val Val Lys Glu Lys Asn His Arg  
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 His Cys Gln Gln Arg Tyr Pro Thr Pro Ala Glu Thr Pro Ala Pro Trp  
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 Ile Val Arg Pro Ala Ile Gly Ile Tyr Lys Tyr Val Glu Ala Asn Gln  
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 Glu Ser Thr Leu His Phe Ile Ser Glu Thr Thr Asp Thr Ser Ala Ile  
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 Thr Ala Ile Pro Arg Gly Glu Met His Ile Glu Ser Leu Leu Tyr Asn  
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 His Glu Thr Met Lys Asp Pro Glu Leu Ala Pro Glu Leu Asp Gln Leu  
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 Met Lys Glu Ile Cys Glu Lys Thr Lys Asp Thr Val Glu Ala Glu Ala  
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Ala Ala Leu Val Ala Lys Ala Leu His Leu Leu Arg Arg Val Pro Glu  
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 Thr Val Val Val Glu Ile Ala Gln Lys Val Arg Gln Gly His Tyr Cys  
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 Ser Asp Ser Ala Lys Leu Glu Ser Ile Phe Leu Asp Ala Val Ala Phe  
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 Leu His Glu Ser Gly Ala Val Lys Val Met Val Gln Glu Ile Leu Asn  
                   370                  375                  380  
  
 Gly Arg Ala Thr Gly Gly Arg Leu Ala Leu Tyr Thr Ala Ala Leu Tyr  
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 Leu Thr Pro Arg Pro Asn Ile Glu Ala Val Lys Ala Leu Thr Pro Leu  
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 Phe Glu Ser Pro Arg Pro Met Pro Ser Leu Leu Leu Ala Ala Ala Ser  
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 Met Val Asn His Tyr Cys Arg His Thr Pro His Cys His Gln Glu Ala  
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 Pro Val Glu Arg Ile Ala Glu Ile Leu Ala Ala Lys Val Glu Gly His  
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 Cys Ser Pro Ser Ile Gly Val Glu Glu Lys Glu Glu Ala Leu Ala Ile  
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 Phe Lys Ala Leu Gly Asn Met Gly Val Val Thr Pro Ala Val Thr Arg  
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 Ala Ala Ala Gln Cys Ile Glu Lys Glu Gly Leu Glu Thr Ser Ile Arg  
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 Val Ala Ala Ala Gln Ala Phe Arg Gln Ala Asn Cys Asp Arg Pro Ala  
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 Val Gln Lys Leu Val Asp Ile Ala Thr Arg Pro Thr Phe Glu Thr Glu  
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 Val Arg Ile Ala Ser Tyr Leu Ala Ala Ile Arg Cys Ala Glu Lys Glu  
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 His Leu Glu Gln Ile Ile Glu Lys Ile Ser Glu Glu Glu Asn Thr Gln  
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 Val Arg Gly Phe Val Leu Gly His Leu Ile Asn Ile Gln Glu Ser Thr  
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 Cys Pro Thr Lys Glu Asn Leu Lys Tyr Leu Leu Thr Asn Val Val Ile  
                   595                  600                  605  
  
 Pro Thr Asp Phe Glu Lys Asp Phe Arg Lys Phe Ser Arg Asn Val Glu  
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 Met Ser Tyr His Ala Pro Ala Phe Gly Met Gly Ala Asp Leu Glu Ser  
                   625                  630                  635                  640

Asn Ile Ile Tyr Ala Pro Gly Ser Phe Ile Pro Arg Ala Val Asn Leu  
 645 650 655  
 Asn Met Lys Ala Ala Val Asp Glu Thr His Met Asp Leu Ala Glu Ile  
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 Gly Ala Arg Phe Glu Gly Ile Asp Ser Ile Ile Glu Glu Leu Phe Gly  
 675 680 685  
 Pro Glu Gly Tyr Leu Arg Lys Ala Thr Phe Gly Lys Ile Met Gln Asp  
 690 695 700  
 Ile Thr Gly Phe Ala Glu Glu Lys Gly Leu Lys Val Met Glu His Ile  
 705 710 715 720  
 Lys Gln Thr Leu Arg Thr Lys Arg Ser Ile Asp Ser Ser Val Ile Ser  
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 Asp Phe Phe Gly Lys Leu Tyr Gly Glu Gly Arg Ser His Thr His Ala  
 740 745 750  
 Glu Val Phe Ala Arg Ile Met Gly His Glu Ile Thr Tyr Ala Asp Val  
 755 760 765  
 Ala Glu Ser Leu Lys Gly Val Thr Ala Asp Thr Leu Ile Glu Thr Phe  
 770 775 780  
 Phe Ser Phe Phe Glu Glu Ser Leu Glu Gln Met Lys Gly Leu Asn Leu  
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 Asn Thr Ala Arg Thr Ala Gln Leu Tyr Met Asp Tyr Ser Leu Pro Thr  
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 Ile Gln Gly Thr Pro Leu Lys Leu Lys Leu Ala Gly Thr Ala Val Ala  
 820 825 830  
 Gly Leu Lys Met Glu Gly Asp Phe Asn Ile Ala Gln Ile Leu Ser Asp  
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 Pro Gly Asn Leu Gln Thr Gly Ile Lys Leu Phe Pro Ala Leu Ser Val  
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 Gln Ala Thr Gly Phe Val Gly Phe Glu Cys Arg Leu Thr Arg Val Gly  
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 Ile Glu Met Glu Asn Thr Ile Ser Ser Ala Thr Gly Ala Ser Ile Asn  
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 Glu Lys Met Glu Leu Leu Asn Ile Lys Ala Glu Thr Tyr Leu Val Lys  
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 Ala Val Gly Lys Lys Leu Thr Lys Ile Thr Pro Pro Thr Val Arg Asp  
 930 935 940  
 Val Arg Val Thr His Ala Ala Cys Leu Asn Ala Val Glu Pro Val Leu  
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Gly Ile Lys Val Cys Tyr Asn Ile Asn Met Pro Asp Val Phe Arg Ala  
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 Lys Ala Asp Pro Ser Met Arg Gly Tyr Leu Met Thr Ala Ala Ile Lys  
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 Ala Thr Thr Pro Arg Arg Ala Glu Met Thr Leu Ser Tyr Thr Lys Glu  
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 Glu Gly Ser His Ile Val Ser Ala Lys Leu Asp Ser Ser Ser Ile Ala  
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 Ala Gly Val Trp Ala Thr Leu Thr Asn Glu Glu Gly His Lys Ala Met  
 1060 1065 1070  
 Glu Thr Tyr Val Lys Phe Asp Tyr Gly Gln Ile Ala Ile Ser Arg Gly  
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 Ile Lys Leu Asp Met Ile Val Lys Glu Glu Ser Ala Gly Lys Glu Phe  
 1090 1095 1100  
 Glu Val Asn Val Phe Ser Gly Arg Ser Arg Arg Phe Thr Pro Glu Ser  
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 His Ile Val Glu Ala Lys Phe Ile Lys Lys Thr Asn Gly Pro Glu Val  
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 Gly Val Tyr Pro Ala Arg Tyr Ile Pro Lys Val Ser Ile Leu Leu Pro  
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 Val Gln Ala Thr His Lys Ile Glu Gly Thr Leu Pro Gln Asn Ile Val  
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Val Phe Arg Thr Ala Gly Asn Glu Lys Val Ala Glu Met Glu Ala Ile  
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 Thr Gly Gly Arg Tyr Ala Leu Glu Ser Ala Ile Lys Tyr Gly Glu Arg  
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 Thr Val Phe Glu Val Thr Gly Pro Val Met Ala Arg Phe Thr Ser Lys  
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 Thr Ala Lys Leu Gln Ala Asn Ile Lys Leu Ser Ala Met Ala Ser Glu  
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 Pro Tyr Ile Ile Gly Ala Asn Phe Val Phe Gly Asn Lys Lys Gln Met  
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 Trp Lys Met Val Gln Glu Ser Ala Glu Lys Thr Thr Leu Ser Ile Ala  
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 Phe Val Leu Pro Ala Leu Ile Glu Asn Lys Val Asp Ala Val Ile Thr  
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 Glu Asp Leu Val His Val Ser Phe Asn Asn Leu Val Leu Pro Lys Thr  
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 Ser Tyr Arg Arg Arg Val Lys Gly Phe Ala Asp Val Asn Ile Gly Glu  
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 Lys Arg Ala Asn Val Glu Phe Ser Trp Asp Ala Asp Lys Ser Pro Glu  
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 Lys Lys Leu Val Val Asp Ala Ser Leu Ile Ser Ser Pro Ser Asn Pro  
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 Gly His Ala Glu Ile His Gly Asn Ile Val Ile Ala Gly Glu Pro Tyr  
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 Gly Glu Asn Gly Phe Lys Leu Leu Leu Thr Thr Pro Ser Gln Lys Thr  
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 Lys Val Val Ser Val Ile Glu Tyr Lys Asn Met Glu Asn Lys Glu Tyr  
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 Lys Tyr Thr Ser Val Ile Ala Leu Glu Lys Leu Gly Gly Pro Tyr Asn  
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Tyr Val Val Lys Ala Lys Val Ile Tyr Lys Gln Pro Glu Thr Gln Glu  
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 Ile Met Leu Glu Thr Glu Val Lys His Gln Trp Thr Pro Glu Glu His  
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 Leu Val Ala Phe Lys Val Gly Ala Lys Ala Pro Val Leu Lys Met Pro  
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 Leu Met Ile Ala Phe Ser Ile His Asn Thr Arg Gly Ser Phe Val Gly  
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 Phe Cys Lys Ile Glu Arg Asn Thr Pro Ser Asn Val Phe Glu Trp Lys  
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 Ile Gln Met Thr Pro Glu Gly Ile Glu Val Val Glu Ala Gly Leu  
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 Asp Ile Lys Ala Ile Asn Glu Val Leu Lys Ile Val His Ala Val Val  
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 Thr Phe Glu Glu Gly Tyr Gln Ala Tyr Gly Gln Glu Thr Ala Lys  
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 Tyr Gln Tyr Arg Phe Thr Arg Pro Ser Pro Thr Thr Tyr Ile Met Gln  
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 Met Arg Thr Pro Thr Arg Thr Ile Glu Gly Arg Ala Lys Leu Ser Pro  
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 Arg Glu Ser Gly Ile Lys Phe Tyr Pro Asn Lys Gly Lys Ala Glu Ala  
                   1765                  1770                  1775  
  
 Lys Tyr Glu Val Gly Tyr Lys Ala Asn His Gln Gly Ser Trp Gly Gln  
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 His Ala Ser Asn Ile Glu Val Arg Met Asn His Pro Thr Leu Pro Lys  
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 Pro Ile Met Val Ala Ala His Tyr Thr Ala Ile Gly Glu Thr Ile Lys  
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 Gly Thr Ile Glu Leu Asp Ile Phe Pro Glu Glu Asn Lys Ile Thr  
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 Gly Thr Leu Glu Thr Gln Arg Ile Ser Glu Asn Ala Ile Arg Val Glu  
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 Val Phe Leu Thr Gly Lys Ile Leu Gln Val Asn Pro Lys Ala Ile Val  
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 Thr Val Ala Tyr Ala Pro Glu Thr Phe Ala Leu Asp Val Val Phe His  
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 Lys Thr Pro Ser Thr Ala Pro Val Phe Ala Leu Ala Ala Lys Tyr Asp  
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Gln Arg Pro Val Phe Glu Ile Thr Ala Val Ala Glu Pro Glu Glu Glu  
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 Val Pro Cys Asn Gly Ile Arg Ile Lys Ala Ile Ala Asn Ala Pro Ala  
 1940 1945 1950  
 Phe Gly Lys Tyr Asn Ile Phe Ser Lys Met Cys Lys Pro Ala Phe Ile  
 1955 1960 1965  
 Glu Leu Thr Thr Met Arg His Gly Gly Glu Lys Glu Tyr Thr Ala Arg  
 1970 1975 1980  
 Leu Gly Leu Arg Tyr Pro Asp Thr Ala Glu Ala Gly Val Tyr Val Ala  
 1985 1990 1995 2000  
 Ser Gly Arg Ala Glu Glu Ile Arg Gly Val Ala Val Ala Ala Val Lys  
 2005 2010 2015  
 Leu Ala Ser Pro Thr Met Leu Lys Val Glu Met Ala Tyr Gly Pro Glu  
 2020 2025 2030  
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 Ala Val Leu Phe Lys Ser Val Val Met Glu Val Val His Phe Leu Glu  
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 Thr Leu Leu Gly Val Ala Lys Glu Glu Ile Glu Glu Ile Tyr Arg Asp  
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 Gln Ala Ile Glu Arg Phe Gln Gly Glu Phe Glu Gly Ile Thr Glu Ile  
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 Val Pro Lys Val Leu Leu Asp Val Leu Glu Gln Ile Arg Ala Ser Lys  
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 Val Phe Arg Ile Val Lys Arg Glu Val Tyr Glu Ile Leu Glu Glu Tyr  
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 Pro Glu Glu Tyr Glu Ala Ile Thr His Val Val Gly Asn Val Met Ala  
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 2225 2230 2235 2240

Pro Ala Val Gln Arg Ile Ile Asp Tyr Ile Met Asn His Phe His Ser  
 2245 2250 2255  
 Lys Gln Val Phe Ala Val Glu Ala Glu Arg Val Val Ser Leu Ile Leu  
 2260 2265 2270  
 Ser Glu Leu Leu Tyr Val Ser Ile Glu Arg Glu Gly Asn Gly Ile Glu  
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 Gln Glu Ala Val Pro Asn Pro Ile Thr Met Leu Glu Asn Leu Ile Phe  
 2305 2310 2315 2320  
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 Tyr Tyr Asn Phe Ile Pro Arg Tyr Ile Thr Asp Val Leu Pro Pro Tyr  
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 Pro Arg Thr Ala Met Val Val Gly Gly Ser Glu Ile Leu Thr Phe Asp  
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 Gly Leu Val Val Arg Ala Pro Arg Ser Pro Cys Lys Val Leu Leu Ala  
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 Ala His Gly Ser His Arg Leu Met Met Ser His Pro Gln Pro Ser Ala  
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 Pro Pro Gln Leu Glu Leu Asn Thr Pro Ala Ala Ser Val Val Ile Lys  
 2405 2410 2415  
 Pro Asp Phe Glu Val Leu Val Asn Gly Arg Pro Leu Thr Gly Ser Gln  
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 Gln Thr Ile Gly Asn Ile Arg Ile Val Asn Ala Ala Lys His Ile Glu  
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 Val Gly Cys Pro Leu Met Lys Val Val Val Ala Lys Thr Gly Gln Val  
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 Gly Val Gln Ala Ser Ser Pro Arg Glu Leu Val Ser Ala Trp Gln Glu  
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 Asp Gln Gly Cys Ser Thr Pro Glu Val Pro Arg Ser Glu Thr Thr Val  
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 Ala Arg Leu Ile Gln Cys Gln Thr Leu Leu Gly Ile Arg Ser Arg Cys  
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Lys	Phe	Asp	Gly	Leu	Leu	Leu	Ser	Gly	Leu	Pro	Thr	Arg	Ser	Ser	Asp
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Asp	Arg	Tyr	Ile	His	Leu	Gln	Leu	Thr	Asp	Ile	Gln	Tyr	Ser	Ala	Ser
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His	Ile	Pro	Gln	Ser	Glu	Gln	Trp	Pro	Lys	Ile	Glu	Ser	Leu	Glu	Gln
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Arg	Glu	Leu	Ser	Asp	Glu	Phe	Lys	Glu	Leu	Leu	Glu	Leu	Pro	Phe	Arg
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Ala	Gln	Ile	Arg	Asn	Gly	Leu	Ile	Ser	Glu	Ile	Gln	Phe	Ser	Ser	Glu
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Asp	Ala	Glu	Trp	Ser	Lys	Asn	Ala	Lys	Arg	Ser	Ile	Leu	Asn	Leu	Phe
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Ser	Leu	Arg	Lys	Ser	Ala	Pro	Val	Asp	Glu	Met	Asn	Gln	Asp	Gln	Lys
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Asp	Met	Glu	Ser	Asp	Lys	Asp	Ser	Val	Phe	Phe	Asn	Val	His	Glu	Lys
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Thr	Met	Glu	Gly	Asp	Cys	Arg	Ser	Arg	Leu	His	Ile	Val	Gln	Glu	Gly
			180				185				190				
Glu	Lys	Thr	Ile	Tyr	Thr	Lys	Ser	Val	Asn	Phe	Asp	Lys	Cys	Ile	Thr
			195				200			205					
Arg	Pro	Glu	Thr	Ala	Tyr	Gly	Leu	Arg	Phe	Gly	Ser	Glu	Cys	Lys	Glu
			210				215			220					
Cys	Glu	Lys	Glu	Gly	Gln	Phe	Val	Lys	Pro	Gln	Thr	Val	Tyr	Thr	Tyr
			225				230			235			240		

Thr Phe Lys Asn Glu Lys Leu Gln Glu Ser Glu Val His Ser Val Tyr  
 245 250 255  
 Thr Leu Asn Val Asn Gly Gln Glu Val Val Lys Ser Glu Thr Arg Ala  
 260 265 270  
 Lys Val Thr Phe Val Glu Glu Ser Lys Ile Asn Arg Glu Ile Lys Lys  
 275 280 285  
 Val Ser Gly Pro Lys Glu Glu Ile Val Tyr Ser Met Glu Asn Glu Lys  
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 Leu Ile Glu Gln Phe Tyr Gln Gln Gly Asp Lys Ala Glu Val Asn Pro  
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 Phe Lys Ala Ile Glu Met Glu Gln Lys Val Glu Gln Leu Gln Glu Ile  
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 Phe Arg Gln Ile Gln Glu His Glu Gln Asn Thr Pro Glu Thr Val His  
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 Leu Ile Ala Arg Ala Val Arg Met Phe Arg Met Cys Thr Ile Glu Glu  
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 Leu Lys Lys Val His Thr Thr Ile Tyr Thr Lys Ala Glu Lys Lys Val  
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 Gln Leu Val Ile Glu Thr Ser Ile Ala Val Ala Gly Thr Lys Asn Thr  
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 Ile Gln His Leu Ile His His Phe Glu Lys Lys Ser Ile Thr Pro Leu  
 405 410 415  
 Arg Ala Ala Glu Leu Leu Lys Ser Val Gln Glu Thr Leu Tyr Pro Ser  
 420 425 430  
 Glu His Ile Ala Asp Leu Leu Ile Gln Leu Ala Gln Ser Pro Leu Ser  
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 Glu Lys Tyr Glu Pro Leu Arg Gln Ser Ala Trp Leu Ala Ala Gly Ser  
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 Val Val Arg Gly Phe Ala Ser Lys Thr Gln Asp Leu Pro Leu Ile Arg  
 465 470 475 480  
 Pro Ala Ser Arg Gln Thr Lys Glu Lys Tyr Val Arg Val Phe Met Gln  
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 His Phe Arg Asn Ala Asp Ser Thr Tyr Glu Lys Val Leu Ala Leu Lys  
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 Thr Leu Gly Asn Ala Gly Ile Asp Leu Ser Val Tyr Glu Leu Val Gln  
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 Asp Ala Leu Arg Leu Leu Lys Asp Val Met Pro Arg Lys Ile Gln Lys  
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Val Leu Leu Pro Val Tyr Lys Asn Arg Gln Asn Lys Pro Glu Leu Arg  
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 Met Ala Ala Leu Trp Arg Met Met His Thr Ile Pro Glu Glu Pro Val  
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 Pro Cys Tyr Gln Gln Leu Ala Val Arg Cys Ser Lys Ile Leu Leu Phe  
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 Thr Arg Tyr Gln Pro Gln Glu Gln Met Leu Ser Thr Tyr Ser Gln Leu  
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 Pro Leu Phe Asn Ser Glu Trp Leu Ser Gly Val Gln Phe Asp Phe Ala  
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 Thr Ile Phe Glu Lys Asn Ala Phe Leu Pro Lys Glu Val Gln Ala Ser  
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 Leu Glu Thr Val Phe Gly Gly Asn Trp Asn Lys Tyr Phe Ala Gln Val  
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 Gly Phe Ser Gln Gln Asn Phe Glu Gln Val Ile Leu Lys Thr Leu Glu  
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 Lys Leu Ser Leu Tyr Gly Lys Gln Ser Asp Glu Leu Arg Ser Arg Arg  
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 Val Gln Ser Gly Ile Gln Met Leu Gln Glu Ile Val Lys Lys Met Asn  
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 Ile Arg Pro Arg Val Gln Gln Thr Asp Ser Gln Asn Ala His Ala Val  
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 Phe Tyr Leu Arg Tyr Lys Glu Met Asp Tyr Ile Val Leu Pro Ile Asp  
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 Met Glu Thr Ile Asp Thr Leu Val Glu Lys Tyr Val Arg Asn Gly Glu  
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 Phe Asp Ile Lys Ser Leu Leu Thr Phe Leu Thr Asn Asp Ser Lys Phe  
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 Glu Leu His Arg Ala Leu Phe Phe Tyr Glu Ala Glu Arg Arg Ile Pro  
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 Thr Thr Ile Gly Met Pro Leu Thr Ile Ser Gly Lys Met Pro Thr Ile  
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 Leu Ser Ile Asn Gly Lys Val Ser Ile Glu Leu Glu Lys Leu Gly Ala  
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 Arg Leu Val Leu Asp Ile Val Pro Thr Val Ala Thr Thr His Val Thr  
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Glu Met Pro Leu Leu Tyr Pro Val Ile Glu Gln Gly Val Lys Ser Leu  
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 Gln Ser Ala Arg Leu His Thr Pro Leu Arg Phe Glu Ser Thr Val Glu  
                   900                  905                  910  
  
 Leu Lys Lys Asn Thr Leu Glu Ile Thr His Lys Phe Val Val Pro Glu  
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 Gly Phe Lys Asn Leu Ile Thr Leu Lys Leu Glu Ala Pro Gln Gln Met  
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 Tyr Trp Asn Thr Glu Leu Arg Thr Val Cys Asp Lys Trp Ile Arg Met  
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 Cys Lys Val Glu Met Asp Ala Arg Arg Ser Pro Met Glu His Glu Asn  
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 Lys Glu Trp Thr Leu Arg Thr Glu Leu Leu Ala Ala Arg Pro Gln Met  
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 Val Asn Ala Gln Leu Glu Gln Ser Thr Glu Gln Lys Lys Phe Ile Arg  
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 Asn Ile Glu Arg Glu Tyr Lys Gly Ile Pro Glu Tyr Glu Leu Leu Ile  
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 Thr Cys Tyr Ser Leu Val Ala Lys Asp Cys Ser Glu Gln Pro Arg Phe  
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 Met Pro Ser Val Ala Ser Gln Asn Gln Leu Cys Gly Leu Cys Gly Asn  
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 Thr Glu Asp Val Glu Glu Phe His Arg Ser Tyr Leu Leu Lys Asn Glu  
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 Glu Cys Glu Phe Glu Phe Asp Arg Ile Ser Glu Lys Lys Asn Tyr Arg  
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 Asn Lys Trp Asn Arg Glu Glu Lys Lys Ser Asp Tyr Glu Ser Ser Ser  
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Ser Arg Phe Leu Gln Gly Ser Ser Glu Gln Thr Val Ala Glu Leu Val  
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Val Ala Tyr

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Glu Glu Asn Ser Ala Thr Arg Ile Gln Ser Leu Ile Arg Ile Gln Pro  
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Glu Asn Gly Asp Phe Met Arg Leu Gln Met Thr Lys Thr Arg Phe Ala  
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Thr Ser Glu Glu Asp Arg Val Leu Ser Phe Glu Asn Met Asn Glu Val  
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Pro Val Ser Glu Lys Val Glu Lys Val Leu Ser Leu Pro Ile Arg Phe  
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Ser Tyr Arg His Gly Met Val Gly Glu Ile Glu Phe Ser Thr Glu Glu  
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Gln Thr Trp Ser Ser Asn Ile Lys Lys Ala Val Val Asn Met Leu Gln  
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Val Asn Leu Val Lys Lys Gly Met Ser Glu Lys Asn Glu Tyr Glu Thr  
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Glu His Asp Asn Asp Phe Phe Leu Ser Asn Glu Arg Thr Leu Glu Gly  
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Glu Cys Glu Val Ala Tyr Thr Lys Ile Glu Lys Ser Glu Lys Glu Gln  
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 Gln Trp Thr Lys Ser Ile Asn Phe Glu Lys Cys Ser Leu Arg Pro Glu  
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 Ile Val Tyr Gly Arg Arg Tyr Ala Glu Glu Cys Asn Glu Cys Arg Glu  
 210 215 220  
 Arg Asp Glu Lys Phe Ser Ser Thr Val Phe Phe Tyr Asn Ile Thr Gly  
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 Thr Pro Glu Phe Leu Ile Asn Ser Val Glu Leu Gln Ser Lys His Met  
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 Ala Val Arg Asn Ser Asp Lys Lys Glu Asn Leu Leu Tyr Asn Pro Glu  
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 His Glu Ile Ala Glu Glu Lys Phe Ala Gln Thr Gly Asp Glu Glu Val  
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 Ser Ser Ser Tyr Ser Gln Leu Arg Arg Ser Gly Arg Asn His Pro Ser  
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 Ala Ala Glu Pro Ser Leu Gln Ala Asp Arg Ala Asn Arg Ala Arg Glu  
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 Ser Ser Ile Arg Ser Leu Val Ser Gln Lys Ser Glu Val Val Gln Ser  
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 Leu Tyr Trp Asp Ala Leu Ala Ile Ala Gly Thr Lys Val Thr Val Ser  
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 His Leu Leu Glu Lys Ile Asn Asn Lys Glu Ile Ser Pro Met Lys Ala  
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 Ser Gln Leu Met Lys Ile Leu Ala Glu Val Arg Ile Pro Ser Glu Gln  
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 Ile Ala Gln Glu Leu His Arg Phe Cys Glu Ser Asp Ile Val Ser Arg  
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 Ser Ala Val Leu Arg Gln Ser Cys Trp Leu Ser Tyr Gly Ser Val Leu  
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 Asn Gly Val Cys Gly Gln Thr Lys Asn Val Tyr Gly Ser Glu Ile Thr  
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Glu Thr Arg Lys Gln Cys Thr Arg Gln Met Lys Glu Lys Tyr Ile Arg  
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 Glu Leu Ile Glu Lys Met Asn Gln Ala Glu Ser Arg Tyr Glu Lys Val  
       515                         520                         525  
  
 Leu Phe Val Lys Ala Ile Ala Asn Ala Gly Ile Asp Thr Ser Val Val  
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 Lys Ile Gln Asn Val Leu Met Pro Val Tyr Arg Asn His Lys Glu Thr  
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 Pro Gly Ile Arg Ile Ser Ala Leu His Met Ile Met Gln Thr Gln Pro  
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 Thr Ser Gly Val Leu Asp Met Ile Val Arg Gly Leu Glu Lys Glu Arg  
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 Ser Gln Gln Val Arg Val Tyr Thr Trp Ser Thr Leu Lys Thr Leu Ser  
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 Glu Ser Glu Asn Pro Ala Glu Lys Glu Ile Arg Arg Arg Val Ser Gln  
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 Ser Leu Ala Ser Ile Pro Val Glu Glu Gln Lys Tyr Leu Glu Ser Lys  
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 His Lys Thr Phe Asn Trp Phe Asn Met Gln Ser Gly Ala Thr Leu Asn  
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 Trp Ala Thr Ile Phe Ser Asn Asp Ser Val Leu Pro Lys Glu Ile Thr  
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 Ala Ser Leu Glu Thr Val Phe Gly Gly Glu Trp Asn Lys Tyr Leu Ala  
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 Gln Ile Gly Leu Tyr Gln Asn Asn Leu Asp Ser Val Leu Ser Lys Leu  
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 Lys Arg Ser Ser Ser Phe Phe Arg Pro Ala Glu Met Leu Arg Ser Leu  
       755                         760                         765  
  
 Val Glu Ser Leu Arg Ile Ser His Arg Gln Val Pro Ala Met Ser Pro  
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 Ile Ala Met Ile Tyr Leu Arg Tyr Lys Asp Gln Asp Tyr Ala Phe Leu  
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 Pro Ile Asp Ile Asp Thr Leu Pro Glu Met Ile Arg Arg Val Ala Arg  
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Asp Gly Gln Leu Asp Leu Ser Glu Ile Glu Lys Val Leu Thr Gln Ala  
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 Ala Arg Phe Thr Val Ala Gly Ser Ala Phe Phe His Glu Thr Val Arg  
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 Lys Val Pro Ser Ala Leu Gly Met Pro Gln Val Met Thr Ser Lys Met  
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 Pro Thr Val Ala Gln Met Asn Gly Glu Val Lys Phe Asp Leu Glu Pro  
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 Leu Asn Ser Asp Lys Phe Thr Gly Leu Arg Leu Arg Val Lys Ala Glu  
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 Pro His Val Ala Ser Thr His Val Cys Lys Leu Glu Leu Phe Thr Pro  
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 Lys Ala Thr Ile Lys Ser Pro Glu Gln Lys Arg His Ile Ala His Phe  
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 Gly Leu Lys Met Thr Val Ser Gly His Tyr Arg Arg Pro Phe Thr Thr  
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 Gln Glu Asp Lys Glu Pro Lys Ser Ser Gln Leu Gln Ser Gln Ile Arg  
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 Lys Val Lys Ser Glu Gly Lys Ala Tyr Lys His Arg Val His Met Lys  
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Phe Phe Ile Asp Ala Glu Lys Val Thr Val Glu Phe Asp Gly Phe Gln  
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 Ala Lys Ile Gln Met Ser Ser Leu Tyr Lys Asn Lys Gln Cys Gly Leu  
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 Cys Gly His Tyr Asp Gly Glu Lys Thr Asn Glu Phe Arg Arg Ala Asp  
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 His His Arg Leu Gly Arg Arg Glu Asp Arg Gln Val Cys Phe Ser Gln  
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 protein precursor

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 Lys Ala Gly Val Lys Ile Gln Ser Lys Val Leu Ile Gly Ala Ala Gly  
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 Pro Asp Ser Tyr Ile Leu Lys Leu Glu Asp Pro Val Ile Ser Gly Tyr  
   65               70                                   75                           80  
  
 Ser Gly Ile Trp Pro Lys Glu Val Phe His Pro Ala Thr Lys Leu Thr  
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 Ser Ala Leu Ser Ala Gln Leu Leu Thr Pro Val Lys Phe Glu Tyr Ala  
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 Asn Gly Val Ile Gly Lys Val Phe Ala Pro Pro Gly Ile Ser Thr Asn  
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 Val Leu Asn Val Phe Arg Gly Leu Leu Asn Met Phe Gln Met Asn Ile  
   130              135                                   140  
  
 Lys Lys Thr Gln Asn Val Tyr Asp Leu Gln Glu Thr Gly Val Lys Gly  
   145              150                                   155                           160  
  
 Val Cys Lys Thr His Tyr Ile Leu His Glu Asp Ser Lys Ala Asp Arg  
   165              170                                   175  
  
 Leu His Leu Thr Lys Thr Asp Leu Asn His Cys Thr Asp Ser Ile  
   180              185                                   190  
  
 His Met Asp Val Gly Met Ala Gly Tyr Thr Glu Lys Cys Ala Glu Cys  
   195              200                                   205  
  
 Met Ala Arg Gly Lys Thr Leu Ser Gly Ala Ile Ser Val Asn Tyr Ile  
   210              215                                   220  
  
 Met Lys Pro Ser Ala Ser Gly Thr Leu Ile Leu Glu Ala Thr Ala Thr  
   225              230                                   235                           240  
  
 Glu Leu Leu Gln Tyr Ser Pro Val Asn Ile Val Asn Gly Ala Val Gln  
   245              250                                   255  
  
 Met Glu Ala Lys Gln Thr Val Thr Phe Val Asp Ile Arg Lys Thr Pro  
   260              265                                   270  
  
 Leu Glu Pro Leu Lys Ala Asp Tyr Ile Pro Arg Gly Ser Leu Lys Tyr  
   275              280                                   285  
  
 Glu Leu Gly Thr Glu Phe Leu Gln Thr Pro Ile Gln Leu Leu Arg Ile  
   290              295                                   300  
  
 Thr Asn Val Glu Ala Gln Ile Val Glu Ser Leu Asn Asn Leu Val Ser  
   305              310                                   315                           320

Leu Asn Met Gly His Ala His Glu Asp Ser Pro Leu Lys Phe Ile Glu  
                   325                  330                  335  
  
 Leu Ile Gln Leu Leu Arg Val Ala Lys Tyr Glu Ser Ile Glu Ala Leu  
                   340                  345                  350  
  
 Trp Ser Gln Phe Lys Thr Lys Ile Asp His Arg His Trp Leu Leu Ser  
                   355                  360                  365  
  
 Ser Ile Pro Ala Ile Gly Thr His Val Ala Leu Lys Phe Ile Lys Glu  
                   370                  375                  380  
  
 Lys Ile Val Ala Gly Glu Val Thr Ala Ala Glu Ala Ala Gln Ala Ile  
                   385                  390                  395                  400  
  
 Met Ser Ser Thr His Leu Val Lys Ala Asp Leu Glu Ala Ile Lys Leu  
                   405                  410                  415  
  
 Gln Glu Gly Leu Ala Val Thr Pro Asn Ile Arg Glu Asn Ala Gly Leu  
                   420                  425                  430  
  
 Arg Glu Leu Val Met Leu Gly Phe Gly Ile Met Val His Lys Tyr Cys  
                   435                  440                  445  
  
 Val Glu Asn Pro Ser Cys Pro Ser Glu Leu Val Arg Pro Val His Asp  
                   450                  455                  460  
  
 Ile Ile Ala Lys Ala Leu Glu Lys Arg Asp Asn Asp Glu Leu Ser Leu  
                   465                  470                  475                  480  
  
 Ala Leu Lys Val Leu Gly Asn Ala Gly His Pro Ser Ser Leu Lys Pro  
                   485                  490                  495  
  
 Ile Met Lys Leu Leu Pro Gly Phe Gly Ser Ser Ala Ser Glu Leu Glu  
                   500                  505                  510  
  
 Leu Arg Val His Ile Asp Ala Thr Leu Ala Leu Arg Lys Ile Gly Lys  
                   515                  520                  525  
  
 Arg Glu Pro Lys Met Ile Gln Asp Val Ala Leu Gln Leu Phe Met Asp  
                   530                  535                  540  
  
 Arg Thr Leu Asp Pro Glu Leu Arg Met Val Ala Val Val Val Leu Phe  
                   545                  550                  555                  560  
  
 Asp Thr Lys Leu Pro Met Gly Leu Ile Thr Thr Leu Ala Gln Ser Leu  
                   565                  570                  575  
  
 Leu Lys Glu Pro Asn Leu Gln Val Leu Ser Phe Val Tyr Ser Tyr Met  
                   580                  585                  590  
  
 Lys Ala Phe Thr Lys Thr Thr Pro Asp His Ser Thr Val Ala Ala  
                   595                  600                  605  
  
 Ala Cys Asn Val Ala Ile Arg Ile Leu Ser Pro Arg Phe Glu Arg Leu  
                   610                  615                  620  
  
 Ser Tyr Arg Tyr Ser Arg Ala Phe His Tyr Asp His Tyr His Asn Pro  
                   625                  630                  635                  640

Trp Met Leu Gly Ala Ala Ala Ser Ala Phe Tyr Ile Asn Asp Ala Ala  
 645 650 655

Thr Val Leu Pro Lys Asn Ile Met Ala Lys Ala Arg Val Tyr Leu Ser  
 660 665 670

Gly Val Ser Val Asp Val Leu Glu Phe Gly Ala Arg Ala Glu Gly Val  
 675 680 685

Gln Glu Ala Leu Leu Lys Ala Arg Asp Val Pro Glu Ser Ala Asp Arg  
 690 695 700

Leu Thr Lys Met Lys Gln Ala Leu Lys Ala Leu Thr Glu Trp Arg Ala  
 705 710 715 720

Asn Pro Ser Arg Gln Pro Leu Gly Ser Leu Tyr Val Lys Val Leu Gly  
 725 730 735

Gln Asp Val Ala Phe Ala Asn Ile Asp Lys Glu Met Val Glu Lys Ile  
 740 745 750

Ile Glu Phe Ala Thr Gly Pro Glu Ile Arg Thr Arg Gly Lys Lys Ala  
 755 760 765

Leu Asp Ala Leu Leu Ser Gly Tyr Ser Met Lys Tyr Ser Lys Pro Met  
 770 775 780

Ser Ala Ile Glu Val Arg His Ile Phe Pro Thr Ser Leu Gly Leu Pro  
 785 790 795 800

Met Glu Leu Ser Leu Tyr Thr Ala Ala Val Thr Ala Ala Ser Val Glu  
 805 810 815

Val Gln Ala Thr Ile Ser Pro Pro Leu Pro Glu Asp Phe His Pro Ala  
 820 825 830

His Leu Leu Lys Ser Asp Ile Ser Met Lys Ala Ser Val Thr Pro Ser  
 835 840 845

Val Ser Leu His Thr Tyr Gly Val Met Gly Val Asn Ser Pro Phe Ile  
 850 855 860

Gln Ala Ser Val Leu Ser Arg Ala Lys Asp His Ala Ala Leu Pro Lys  
 865 870 875 880

Lys Met Glu Ala Arg Leu Asp Ile Val Lys Gly Tyr Phe Ser Tyr Gln  
 885 890 895

Phe Leu Pro Val Glu Gly Val Lys Thr Ile Ala Ser Ala Arg Leu Glu  
 900 905 910

Thr Val Ala Ile Ala Arg Asp Val Glu Gly Leu Ala Ala Lys Val  
 915 920 925

Thr Pro Val Val Pro Tyr Glu Pro Ile Val Ser Lys Asn Ala Thr Leu  
 930 935 940

Asn Leu Ser Gln Met Ser Tyr Tyr Leu Asn Asp Ser Ile Ser Ala Ser  
 945 950 955 960

Ser Glu Leu Leu Pro Phe Ser Leu Gln Arg Gln Thr Gly Lys Asn Lys  
 965 970 975  
 Ile Pro Lys Pro Ile Val Lys Lys Met Cys Ala Thr Thr Tyr Thr Tyr  
 980 985 990  
 Gly Ile Glu Gly Cys Val Asp Ile Trp Ser Arg Asn Ala Thr Phe Leu  
 995 1000 1005  
 Arg Asn Thr Pro Ile Tyr Ala Ile Ile Gly Asn His Ser Leu Leu Val  
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 Asn Val Thr Pro Ala Ala Gly Pro Ser Ile Glu Arg Ile Glu Ile Glu  
 1025 1030 1035 1040  
 Val Gln Phe Gly Glu Gln Ala Ala Glu Lys Ile Leu Lys Glu Val Tyr  
 1045 1050 1055  
 Leu Asn Glu Glu Glu Val Leu Glu Asp Lys Asn Val Leu Met Lys  
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 Leu Lys Lys Ile Leu Ser Pro Gly Leu Lys Asn Ser Thr Lys Ala Ser  
 1075 1080 1085  
 Ser Ser Ser Ser Gly Ser Ser Arg Ser Ser Arg Ser Arg Ser Ser Ser  
 1090 1095 1100  
 Ser Ser Ser Ser Ser Ser Ser Ser Ser Arg Ser Ser Ser Ser Ser Ser  
 1105 1110 1115 1120  
 Ser Ser Arg Ser Ser Ser Ser Leu Arg Arg Asn Ser Lys Met Leu Asp  
 1125 1130 1135  
 Leu Ala Asp Pro Leu Asn Ile Thr Ser Lys Arg Ser Ser Ser Ser Ser  
 1140 1145 1150  
 Ser  
 1155 1160 1165  
 Ser Lys Thr Lys Trp Gln Leu His Glu Arg Asn Phe Thr Lys Asp His  
 1170 1175 1180  
 Ile His Gln His Ser Val Ser Lys Glu Arg Leu Asn Ser Lys Ser Ser  
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 Ala Ser Ser Phe Glu Ser Ile Tyr Asn Lys Ile Thr Tyr Leu Ser Asn  
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 Ile Val Ser Pro Val Val Thr Val Leu Val Arg Ala Ile Arg Ala Asp  
 1220 1225 1230  
 His Lys Asn Gln Gly Tyr Gln Ile Ala Val Tyr Tyr Asp Lys Leu Thr  
 1235 1240 1245  
 Thr Arg Val Gln Ile Ile Val Ala Asn Leu Thr Glu Asp Asp Asn Trp  
 1250 1255 1260  
 Arg Ile Cys Ser Asp Ser Met Met Leu Ser His His Lys Val Met Thr  
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Arg Val Thr Trp Gly Ile Gly Cys Lys Gln Tyr Asn Thr Thr Ile Val  
 1285 1290 1295  
 Ala Glu Thr Gly Arg Val Glu Lys Glu Pro Ala Val Arg Val Lys Leu  
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 Ala Trp Ala Arg Leu Pro Thr Tyr Ile Arg Asp Tyr Ala Arg Arg Val  
 1315 1320 1325  
 Ser Arg Tyr Ile Ser Arg Val Ala Glu Asp Asn Gly Val Asn Arg Thr  
 1330 1335 1340  
 Lys Val Ala Ser Lys Pro Lys Glu Ile Lys Leu Thr Val Ala Val Ala  
 1345 1350 1355 1360  
 Asn Glu Thr Ser Leu Asn Val Thr Leu Asn Thr Pro Lys Asn Thr Phe  
 1365 1370 1375  
 Phe Lys Leu Gly Trp Val Leu Pro Phe Tyr Leu Pro Ile Asn Asn Thr  
 1380 1385 1390  
 Ala Ala Glu Leu Gln Ala Phe Gln Gly Arg Trp Met Asp Gln Val Thr  
 1395 1400 1405  
 Tyr Met Leu Thr Lys Ser Ala Ala Glu Cys Thr Val Val Glu Asp  
 1410 1415 1420  
 Thr Val Val Thr Phe Asn Asn Arg Lys Tyr Lys Thr Glu Thr Pro His  
 1425 1430 1435 1440  
 Ser Cys His Gln Val Leu Ala Gln Asp Cys Thr Ser Glu Ile Lys Phe  
 1445 1450 1455  
 Ile Val Leu Leu Lys Arg Asp Gln Thr Ala Glu Arg Asn Glu Ile Ser  
 1460 1465 1470  
 Ile Lys Ile Glu Asn Ile Asp Val Asp Met Tyr Pro Lys Asp Asn Ala  
 1475 1480 1485  
 Val Val Val Lys Val Asn Gly Val Glu Ile Pro Leu Thr Asn Leu Pro  
 1490 1495 1500  
 Tyr Gln His Pro Thr Gly Asn Ile Gln Ile Arg Gln Arg Glu Glu Gly  
 1505 1510 1515 1520  
 Ile Ser Leu His Ala Pro Ser His Gly Leu Gln Glu Val Phe Leu Ser  
 1525 1530 1535  
 Leu Asn Lys Val Gln Val Lys Val Val Asp Trp Met Arg Gly Gln Thr  
 1540 1545 1550  
 Cys Gly Leu Cys Gly Lys Ala Asp Gly Glu Val Arg Gln Glu Tyr Ser  
 1555 1560 1565  
 Thr Pro Asn Glu Arg Val Ser Arg Asn Ala Thr Ser Phe Ala His Ser  
 1570 1575 1580  
 Trp Val Leu Pro Ala Lys Ser Cys Arg Asp Ala Ser Glu Cys Tyr Met  
 1585 1590 1595 1600

Gln Leu Glu Ser Val Lys Leu Glu Lys Gln Ile Ser Leu Glu Gly Glu  
           1605                     1610                     1615  
  
 Glu Ser Lys Cys Tyr Ser Val Glu Pro Val Trp Arg Cys Leu Pro Gly  
           1620                     1625                     1630  
  
 Cys Ala Pro Val Arg Thr Thr Ser Val Thr Val Gly Leu Pro Cys Val  
           1635                     1640                     1645  
  
 Ser Leu Asp Ser Asn Leu Asn Arg Ser Asp Ser Leu Ser Ser Ile Tyr  
           1650                     1655                     1660  
  
 Gln Lys Ser Val Asp Val Ser Glu Thr Ala Glu Ser His Leu Ala Cys  
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 Arg Cys Thr Pro Gln Cys Ala  
           1685

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 <212> PRT  
 <213> Oncorhynchus mykiss

<220>  
 <223> rainbow trout vitellogenin

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 Ser Val Asn Phe Ala Pro Asp Phe Ala Ala Ser Lys Thr Tyr Val Tyr  
     20                  25                             30  
  
 Lys Tyr Glu Ala Leu Leu Gly Gly Leu Pro Glu Glu Gly Leu Ala  
     35                  40                             45  
  
 Arg Ala Gly Val Lys Val Ile Ser Lys Val Leu Ile Ser Ala Val Ala  
     50                  55                             60  
  
 Glu Asn Thr Tyr Leu Leu Lys Leu Val Asn Pro Glu Ile Phe Glu Tyr  
     65                  70                             75                     80  
  
 Ser Gly Val Trp Pro Lys Asp Pro Phe Val Pro Ala Ala Lys Leu Thr  
     85                  90                             95  
  
 Ser Ala Leu Ala Ala Gln Phe Ser Ile Pro Ile Lys Phe Glu Tyr Ala  
     100                 105                             110  
  
 Lys Gly Val Val Gly Lys Val Leu Ala Pro Thr Ala Val Ser Glu Thr  
     115                 120                             125  
  
 Val Leu Asn Val His Arg Gly Ile Leu Asn Ile Leu Gln Leu Asn Ile  
     130                 135                             140  
  
 Lys Lys Thr Gln Asn Val Tyr Glu Leu Gln Glu Ala Gly Ala Gln Gly  
     145                 150                             155                     160  
  
 Val Cys Lys Thr His Tyr Val Ile Arg Glu Asp Ala Lys Ala Glu Arg  
     165                 170                             175

Ile His Leu Thr Lys Ser Lys Asp Leu Asn Asn Cys Gln Gln Arg Ile  
     180                        185                        190  
  
 Met Lys Asp Phe Gly Leu Ala Tyr Thr Glu Lys Cys Val Glu Cys Arg  
     195                        200                        205  
  
 Gln Arg Gly Glu Ala Leu Met Gly Ala Ala Thr Tyr Asn Tyr Leu Met  
     210                        215                        220  
  
 Lys Pro Ala Asp Asn Gly Ala Leu Ile Leu Glu Ala Thr Val Thr Glu  
     225                        230                        235                        240  
  
 Leu His Gln Phe Thr Pro Phe Asn Glu Met Ser Gly Ala Ala Gln Met  
     245                        250                        255  
  
 Glu Ala Lys Gln Met Leu Thr Phe Val Glu Ile Lys Lys Asp Pro Ile  
     260                        265                        270  
  
 Ile Val Pro Asp Asn Asn Tyr Val His Arg Gly Ser Ile Arg Tyr Glu  
     275                        280                        285  
  
 Phe Ala Thr Glu Ile Leu Gln Met Pro Ile Gln Leu Leu Lys Ile Ser  
     290                        295                        300  
  
 Asn Ala Arg Ala Gln Ala Val Lys Ile Leu Asn His Leu Val Thr Tyr  
     305                        310                        315                        320  
  
 Asn Thr Ala Pro Val His Glu Asp Ala Pro Leu Lys Phe Leu Gln Phe  
     325                        330                        335  
  
 Ile Gln Leu Leu Arg Met Ala Ser Ser Glu Thr Ile Asn Ala Ile Trp  
     340                        345                        350  
  
 Ala Glu Phe Lys Ala Lys Pro Ala Tyr Arg His Trp Ile Leu Asp Ala  
     355                        360                        365  
  
 Val Pro Ser Ile Gly Ser Ser Val Ala Val Arg Phe Ile Lys Glu Lys  
     370                        375                        380  
  
 Phe Leu Ala Gly Asp Ile Thr Ile Phe Glu Ala Ala Gln Ala Leu Val  
     385                        390                        395                        400  
  
 Ala Ala Val His Met Val Ala Ala Asp Leu Glu Thr Val Lys Leu Val  
     405                        410                        415  
  
 Glu Ser Leu Ala Phe Asn His Lys Ile Gln Thr His Pro Val Leu Arg  
     420                        425                        430  
  
 Glu Leu Thr Met Leu Gly Tyr Gly Thr Met Val Ser Lys Tyr Cys Val  
     435                        440                        445  
  
 Glu His Pro Asn Cys Pro Ala Glu Leu Val Lys Pro Ile His Glu Leu  
     450                        455                        460  
  
 Ala Val Gln Ala Val Ala Asn Ser Lys Phe Glu Glu Leu Ser Met Val  
     465                        470                        475                        480  
  
 Leu Lys Ala Leu Gly Asn Ala Gly His Pro Ala Ser Ile Lys Pro Ile  
     485                        490                        495

Thr Lys Leu Leu Pro Val Phe Gly Thr Ala Ala Ala Ala Leu Pro Leu  
       500                         505                         510  
  
 Arg Val Gln Ala Asp Ala Val Leu Ala Leu Arg Asn Ile Ala Lys Arg  
       515                         520                         525  
  
 Glu Pro Arg Met Val Gln Glu Val Ala Val Gln Leu Phe Met Asp Lys  
       530                         535                         540  
  
 Ala Leu His Pro Glu Leu Arg Met Leu Ala Cys Ile Val Leu Phe Glu  
       545                         550                         555                         560  
  
 Thr Lys Pro Pro Met Gly Leu Val Ile Thr Leu Ala Ser Ile Leu Lys  
       565                         570                         575  
  
 Thr Glu Lys Asn Met Gln Val Ala Ser Phe Thr Tyr Ser His Met Met  
       580                         585                         590  
  
 Ser Leu Thr Arg Ser Thr Ala Pro Asp Phe Ala Ser Val Ala Ala Ala  
       595                         600                         605  
  
 Cys Asn Val Ala Val Lys Met Leu Ser Asn Lys Phe Arg Arg Leu Ser  
       610                         615                         620  
  
 Cys His Phe Ser Gln Ala Ile His Leu Asp Ala Tyr Ser Asn Pro Leu  
       625                         630                         635                         640  
  
 Arg Ile Gly Ala Ala Ala Ser Ala Phe Tyr Ile Asn Asp Ala Ala Thr  
       645                         650                         655  
  
 Leu Phe Pro Arg Thr Val Val Ala Lys Ala Arg Thr Tyr Phe Ala Gly  
       660                         665                         670  
  
 Ala Ala Ala Asp Val Leu Glu Val Gly Val Arg Thr Glu Gly Ile Gln  
       675                         680                         685  
  
 Glu Ala Leu Leu Lys Leu Pro Pro Ala Pro Glu Asn Ala Asp Arg Ile  
       690                         695                         700  
  
 Thr Lys Met Arg Arg Val Ile Lys Ala Leu Ser Asp Trp Arg Ser Leu  
       705                         710                         715                         720  
  
 Ala Thr Ser Lys Pro Leu Ala Ser Ile Tyr Val Lys Phe Phe Gly Gln  
       725                         730                         735  
  
 Glu Ile Ala Phe Ala Asn Ile Asp Lys Ser Ile Ile Asp Gln Ala Leu  
       740                         745                         750  
  
 Gln Leu Ala Asn Ser Pro Ser Ala His Ala Leu Gly Arg Asn Ala Leu  
       755                         760                         765  
  
 Lys Ala Leu Leu Ala Gly Ala Thr Phe Gln Tyr Val Lys Pro Leu Leu  
       770                         775                         780  
  
 Ala Ala Glu Val Arg Arg Ile Phe Pro Thr Ala Val Gly Leu Pro Met  
       785                         790                         795                         800  
  
 Glu Leu Ser Tyr Tyr Thr Ala Ala Val Ala Lys Ala Tyr Val Asn Val  
       805                         810                         815

Arg Ala Thr Leu Thr Pro Ala Leu Pro Glu Thr Phe His Ala Ala Gln  
                   820                  825                  830  
  
 Leu Leu Lys Thr Asn Ile Glu Leu His Ala Glu Val Arg Pro Ser Ile  
                   835                  840                  845  
  
 Val Met His Thr Phe Ala Val Met Gly Val Asn Thr Ala Phe Ile Gln  
                   850                  855                  860  
  
 Ala Ala Ile Met Ala Arg Ala Lys Val Arg Thr Ile Val Pro Ala Lys  
                   865                  870                  880  
  
 Phe Ala Ala Gln Leu Asp Ile Ala Asn Gly Asn Phe Lys Phe Glu Ala  
                   885                  890                  895  
  
 Phe Pro Val Ser Pro Pro Glu His Ile Ala Ala Ala His Ile Glu Thr  
                   900                  905                  910  
  
 Phe Ala Val Ala Arg Asn Val Glu Asp Val Pro Ala Glu Arg Ile Thr  
                   915                  920                  925  
  
 Pro Leu Ile Pro Ala Gln Gly Val Ala Arg Ser Thr Gln Gln Ser Arg  
                   930                  935                  940  
  
 Asp Lys Leu Thr Ser Met Ile Ala Asp Ser Ala Ala Ser Phe Ala Gly  
                   945                  950                  955                  960  
  
 Ser Leu Ser Arg Ser Ser Glu Ile Leu Tyr Ser Asp Leu Pro Ser Asn  
                   965                  970                  975  
  
 Phe Lys Pro Ile Ile Lys Ala Ile Val Val His Leu Glu Glu Thr Ile  
                   980                  985                  990  
  
 Cys Val Glu Arg Leu Gly Val Lys Ala Cys Phe Glu Phe Thr Ser Glu  
                   995                  1000                  1005  
  
 Ser Ala Ala Phe Ile Arg Asn Thr Leu Phe Tyr Asn Met Ile Gly Lys  
                   1010                  1015                  1020  
  
 His Ser Val Leu Ile Ser Val Lys Pro Ser Ala Ser Glu Pro Ala Ile  
                   1025                  1030                  1035                  1040  
  
 Glu Arg Leu Glu Phe Glu Val Gln Val Gly Pro Lys Ala Ala Glu Lys  
                   1045                  1050                  1055  
  
 Ile Ile Lys Val Ile Thr Met Asn Glu Glu Glu Ala Pro Glu Gly  
                   1060                  1065                  1070  
  
 Lys Thr Val Leu Leu Lys Leu Lys Ile Leu Leu Pro Asp Leu Lys  
                   1075                  1080                  1085  
  
 Asn Gly Thr Arg Ala Ser  
                   1090                  1095                  1100  
  
 Ser Arg Ser Ser Ser Ser Arg Ser Arg Lys Ser Glu Ser Ser  
                   1105                  1110                  1115                  1120  
  
 Ser Ser Ser Ser Ser Ser Arg Ile Ser Lys Arg Asp Gly Pro  
                   1125                  1130                  1135

Asp Gln Pro Tyr Asn Pro Asn Asp Arg Lys Phe Lys Lys Asn His Lys  
                   1140                  1145                  1150

Asp Ser Gln Ser Thr Ser Asn Val Ile Ser Arg Ser Lys Ser Ser Ala  
                   1155                  1160                  1165

Ser Ser Phe His Ala Ile Tyr Lys Gln Asp Lys Phe Leu Gly Asn Lys  
                   1170                  1175                  1180

Leu Ala Pro Met Val Ile Ile Leu Phe Arg Leu Val Arg Ala Asp His  
                   1185                  1190                  1195                  1200

Lys Ile Glu Gly Tyr Gln Val Thr Ala Tyr Leu Asn Lys Ala Thr Ser  
                   1205                  1210                  1215

Arg Leu Gln Ile Ile Met Ala Ala Leu Asp Glu Asn Asp Asn Trp Lys  
                   1220                  1225                  1230

Leu Cys Ala Asp Gly Val Leu Leu Ser Lys His Lys Val Thr Ala Lys  
                   1235                  1240                  1245

Ile Ala Trp Gly Ala Glu Cys Lys Asp Tyr Asn Thr Phe Ile Thr Ala  
                   1250                  1255                  1260

Glu Thr Gly Leu Val Gly Pro Ser Pro Ala Val Arg Leu Arg Leu Ser  
                   1265                  1270                  1275                  1280

Trp Asp Lys Leu Pro Lys Val Pro Lys Ala Val Trp Arg Tyr Val Arg  
                   1285                  1290                  1295

Ile Val Ser Glu Phe Ile Pro Gly Tyr Ile Pro Tyr Tyr Leu Ala Asp  
                   1300                  1305                  1310

Leu Val Pro Met Gln Lys Asp Lys Asn Asn Glu Lys Gln Ile Gln Phe  
                   1315                  1320                  1325

Thr Val Val Ala Thr Ser Glu Arg Thr Leu Asp Val Ile Leu Lys Thr  
                   1330                  1335                  1340

Pro Lys Met Thr Leu Tyr Lys Leu Gly Val Asn Leu Pro Cys Ser Leu  
                   1345                  1350                  1355                  1360

Pro Phe Glu Ser Met Thr Asp Leu Ser Pro Phe Asp Asp Asn Ile Val  
                   1365                  1370                  1375

Asn Lys Ile His Tyr Leu Phe Ser Glu Val Asn Ala Val Lys Cys Ser  
                   1380                  1385                  1390

Met Val Arg Asp Thr Leu Thr Thr Phe Asn Asn Lys Lys Tyr Lys Ile  
                   1395                  1400                  1405

Asn Met Pro Leu Ser Cys Tyr Gln Val Leu Ala Gln Asp Cys Thr Thr  
                   1410                  1415                  1420

Glu Leu Lys Phe Met Val Leu Leu Lys Lys Asp His Ala Ser Glu Gln  
                   1425                  1430                  1435                  1440

Asn His Ile Asn Val Lys Ile Ser Asp Ile Asp Val Asp Leu Tyr Thr  
                   1445                  1450                  1455

Glu Asp His Gly Val Ile Val Lys Val Asn Glu Met Glu Ile Ser Asn  
                   1460                  1465                  1470  
  
 Asp Asn Leu Pro Tyr Lys Asp Pro Ser Gly Ser Ile Lys Ile Asp Arg  
                   1475                  1480                  1485  
  
 Lys Gly Lys Gly Val Ser Leu Tyr Ala Pro Ser His Gly Leu Gln Glu  
                   1490                  1495                  1500  
  
 Val Tyr Phe Asp Lys Tyr Ser Trp Lys Ile Lys Val Val Asp Trp Met  
                   1505                  1510                  1515                  1520  
  
 Lys Gly Gln Thr Cys Gly Leu Cys Gly Lys Ala Asp Gly Glu Asn Arg  
                   1525                  1530                  1535  
  
 Gln Glu Tyr Arg Thr Pro Ser Gly Arg Leu Thr Lys Ser Ser Val Ser  
                   1540                  1545                  1550  
  
 Phe Ala His Ser Trp Val Leu Pro Ser Asp Ser Cys Arg Asp Ala Ser  
                   1555                  1560                  1565  
  
 Glu Cys Leu Met Lys Leu Glu Ser Val Lys Leu Glu Lys Gln Val Ile  
                   1570                  1575                  1580  
  
 Val Asp Asp Arg Glu Ser Lys Cys Tyr Ser Val Glu Pro Val Leu Arg  
                   1585                  1590                  1595                  1600  
  
 Cys Leu Pro Gly Cys Leu Pro Val Arg Thr Thr Pro Ile Thr Ile Gly  
                   1605                  1610                  1615  
  
 Phe His Cys Leu Pro Val Asp Ser Asn Leu Asn Arg Ser Glu Gly Leu  
                   1620                  1625                  1630  
  
 Ser Ser Ile Tyr Glu Lys Ser Val Asp Leu Met Glu Lys Ala Glu Ala  
                   1635                  1640                  1645  
  
 His Val Ala Cys Arg Cys Ser Glu Gln Cys Met  
                   1650                  1655

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 <213> Fundulus heteroclitus

<220>  
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 protein precursor

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Asn Phe Ala Pro Glu Phe Ala Ala Gly Lys Thr Tyr Val Tyr Lys Tyr  
     20                  25                  30

Glu Ala Leu Ile Leu Gly Gly Leu Pro Glu Glu Gly Leu Ala Arg Ala  
     35                  40                  45

Gly Leu Lys Ile Ser Thr Lys Leu Leu Leu Ser Ala Ala Asp Gln Asn  
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Thr Tyr Met Leu Lys Leu Val Glu Pro Glu Leu Ser Glu Tyr Ser Gly  
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 Ile Trp Pro Lys Asp Pro Ala Val Pro Ala Thr Lys Leu Thr Ala Ala  
 85 90 95  
 Leu His Leu Ser Ser Gln Phe Pro Ser Ser Leu Asn Thr Pro Met Val  
 100 105 110  
 Phe Val Gly Lys Val Phe Ala Pro Glu Glu Val Ser Thr Leu Val Leu  
 115 120 125  
 Asn Ile Tyr Arg Gly Ile Leu Asn Ile Leu Gln Leu Asn Ile Lys Lys  
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 Thr His Lys Val Tyr Asp Leu Gln Glu Val Gly Thr Gln Gly Val Cys  
 145 150 155 160  
 Lys Thr Leu Tyr Ser Ile Ser Glu Asp Ala Arg Ile Glu Asn Ile Leu  
 165 170 175  
 Leu Thr Lys Thr Arg Asp Leu Ser Asn Cys Gln Glu Arg Leu Asn Lys  
 180 185 190  
 Asp Ile Gly Leu Ala Tyr Thr Glu Lys Cys Asp Lys Cys Gln Glu Glu  
 195 200 205  
 Thr Lys Asn Leu Arg Gly Thr Thr Leu Ser Tyr Val Leu Lys Pro  
 210 215 220  
 Val Ala Asp Ala Val Met Ile Leu Lys Ala Tyr Val Asn Glu Leu Ile  
 225 230 235 240  
 Gln Phe Ser Pro Phe Ser Glu Ala Asn Gly Ala Ala Gln Met Arg Thr  
 245 250 255  
 Lys Gln Ser Leu Glu Phe Leu Glu Ile Glu Lys Glu Pro Ile Pro Ser  
 260 265 270  
 Val Lys Ala Glu Tyr Arg His Arg Gly Ser Leu Lys Tyr Glu Phe Ser  
 275 280 285  
 Asp Glu Leu Leu Gln Thr Pro Leu Gln Leu Ile Lys Ile Ser Asp Ala  
 290 295 300  
 Pro Ala Gln Val Ala Glu Val Leu Lys His Leu Ala Thr Tyr Asn Ile  
 305 310 315 320  
 Glu Asp Val His Glu Asn Ala Pro Leu Lys Phe Leu Glu Leu Val Gln  
 325 330 335  
 Leu Leu Arg Ile Ala Arg Tyr Glu Asp Leu Glu Met Tyr Trp Asn Gln  
 340 345 350  
 Tyr Lys Lys Met Ser Pro His Arg His Trp Phe Leu Asp Thr Ile Pro  
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 Ala Thr Gly Thr Phe Ala Gly Leu Arg Phe Ile Lys Glu Lys Phe Met  
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Ala Glu Glu Ile Thr Ile Ala Glu Ala Ala Gln Ala Phe Ile Thr Ala  
 385                   390                   395                   400  
  
 Val His Met Val Thr Ala Asp Pro Glu Val Ile Lys Leu Phe Glu Ser  
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 Val Phe Leu Gly Tyr Gly Thr Met Val Asn Lys Tyr Cys Asn Lys Thr  
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 Val Asp Cys Pro Val Glu Leu Ile Lys Pro Ile Gln Gln Arg Leu Ser  
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 Asp Ala Ile Ala Lys Asn Glu Glu Asn Ile Ile Leu Tyr Ile Lys  
 465                   470                   475                   480  
  
 Val Leu Gly Asn Ala Gly His Pro Ser Ser Phe Lys Ser Leu Thr Lys  
 485                   490                   495  
  
 Ile Met Pro Ile His Gly Thr Ala Ala Val Ser Leu Pro Met Thr Ile  
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 His Val Glu Ala Ile Met Ala Leu Arg Asn Ile Ala Lys Lys Glu Ser  
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 Arg Met Val Gln Glu Leu Ala Leu Gln Leu Tyr Met Asp Lys Ala Leu  
 530                   535                   540  
  
 His Pro Glu Leu Arg Met Leu Ser Cys Ile Val Leu Phe Glu Thr Ser  
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 Pro Ser Met Gly Leu Val Thr Thr Val Ala Asn Ser Val Lys Thr Glu  
 565                   570                   575  
  
 Glu Asn Leu Gln Val Ala Ser Phe Thr Tyr Ser His Met Lys Ser Leu  
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 Ser Arg Ser Pro Ala Thr Ile His Pro Asp Val Ala Ala Ala Cys Ser  
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 Ala Ala Met Lys Ile Leu Gly Thr Lys Leu Asp Arg Leu Ser Leu Arg  
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 Tyr Ser Lys Ala Val His Val Asp Leu Tyr Asn Ser Ser Leu Ala Val  
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 Gly Ala Ala Ala Thr Ala Phe Tyr Ile Asn Asp Ala Ala Thr Phe Met  
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 Pro Lys Ser Phe Val Ala Lys Thr Lys Gly Phe Ile Ala Gly Ser Thr  
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 Ala Glu Val Leu Glu Ile Gly Ala Asn Ile Glu Gly Leu Gln Glu Leu  
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 690                   695                   700

Met Lys Arg Val Ile Lys Ala Leu Ser Glu Trp Arg Ser Leu Pro Thr  
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 Ser Lys Pro Leu Ala Ser Val Tyr Val Lys Phe Phe Gly Gln Glu Ile  
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 Gly Phe Ala Asn Ile Asp Lys Pro Met Ile Asp Lys Ala Val Lys Phe  
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 Gly Lys Glu Leu Pro Ile Gln Glu Tyr Gly Arg Glu Ala Leu Lys Ala  
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 Leu Leu Leu Ser Gly Ile Asn Phe His Tyr Ala Lys Pro Val Leu Ala  
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 Ala Glu Met Arg Arg Ile Leu Pro Thr Val Ala Gly Ile Pro Met Glu  
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 Pro Asn Thr Ser Pro Arg Leu Ser Ala Asp Phe Asp Val Lys Thr Leu  
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 Leu Glu Thr Asp Val Glu Leu Lys Ala Glu Ile Arg Pro Met Val Ala  
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 Met Asp Thr Tyr Ala Val Met Gly Leu Asn Thr Asp Ile Phe Gln Ala  
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 Ala Leu Val Ala Arg Ala Lys Leu His Ser Val Val Pro Ala Lys Ile  
 865 870 875 880  
 Ala Ala Arg Leu Asn Ile Lys Glu Gly Asp Phe Lys Leu Glu Ala Leu  
 885 890 895  
 Pro Val Asp Val Pro Glu Asn Ile Thr Ser Met Asn Val Thr Thr Phe  
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 915 920 925  
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 Ser Lys Leu Asp Pro Thr Arg Asn Ser Met Leu Asp Ser Ser Glu Leu  
 945 950 955 960  
 Leu Pro Met Glu Glu Asp Val Glu Pro Ile Pro Glu Tyr Lys Phe  
 965 970 975  
 Arg Arg Phe Ala Lys Lys Tyr Cys Ala Lys His Ile Gly Val Gly Leu  
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 995 1000 1005  
 Ile Val Leu Tyr Lys Leu Ala Gly Ser His Asn Phe Ser Phe Ser Val  
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Thr Pro Ile Glu Gly Glu Val Val Glu Arg Leu Glu Met Glu Val Lys  
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Val Gly Ala Lys Ala Ala Glu Lys Leu Val Lys Arg Ile Asn Leu Ser  
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Glu Asp Glu Glu Thr Glu Glu Gly Pro Val Leu Val Lys Leu Asn  
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Lys Ile Leu Ser Ser Arg Arg Asn Ser Ser Ser Ser Ser Ser Ser  
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Ser Ser Ser Ser Glu Ser Arg Ser Ser Arg Ser Ser Ser Ser Ser  
 1090 1095 1100

Ser Ser Ser Ser Arg Ser Ser Arg Lys Ile Asp Leu Ala Ala Arg Thr  
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Asn Ser Ser Ser Ser Ser Ser Arg Arg Ser Arg Ser Ser Ser Ser  
 1125 1130 1135

Ser  
 1140 1145 1150

Arg Arg Ser Arg  
 1155 1160 1165

Ser Ser Arg Arg Val Asn Ser Thr Arg Ser Ser Ser Ser Ser Arg  
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Thr Ser Ser Ala Ser Ser Leu Ala Ser Phe Phe Ser Asp Ser Ser Ser  
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Ser Ser Ser Ser Asp Arg Arg Ser Lys Glu Val Met Glu Lys Phe  
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Gln Arg Leu His Lys Lys Met Val Ala Ser Gly Ser Ser Ala Ser Ser  
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Val Glu Ala Ile Tyr Lys Glu Lys Lys Tyr Leu Gly Glu Glu Ala  
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Val Val Ala Val Ile Leu Arg Ala Val Lys Ala Asp Lys Arg Met Val  
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Gly Tyr Gln Leu Gly Phe Tyr Leu Asp Lys Pro Asn Ala Arg Val Gln  
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Ile Ile Val Ala Asn Ile Ser Ser Asp Ser Asn Trp Arg Ile Cys Ala  
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Asp Ala Val Val Leu Ser Lys His Lys Val Thr Thr Lys Ile Ser Trp  
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Gly Glu Gln Cys Arg Lys Tyr Ser Thr Asn Val Thr Gly Glu Thr Gly  
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Ile Val Ser Ser Ser Pro Ala Ala Arg Leu Arg Val Ser Trp Glu Arg  
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Leu Pro Ser Thr Leu Lys Arg Tyr Gly Lys Met Val Asn Lys Tyr Val  
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 Pro Val Lys Ile Leu Ser Asp Leu Ile His Thr Lys Arg Glu Asn Ser  
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 Thr Arg Asn Ile Ser Val Ile Ala Val Ala Thr Ser Glu Lys Thr Ile  
 1380                    1385                    1390  
  
 Asp Ile Ile Thr Lys Thr Pro Met Ser Ser Val Tyr Asn Val Thr Met  
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 His Leu Pro Met Cys Ile Pro Ile Asp Glu Ile Lys Gly Leu Ser Pro  
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 Phe Asp Glu Val Ile Asp Lys Ile His Phe Met Val Ser Lys Ala Ala  
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 Arg Ser Tyr Lys Asn Lys Met Pro Ser Ser Cys Tyr Gln Val Ala Ala  
 1460                    1465                    1470  
  
 Gln Asp Cys Thr Asp Glu Leu Lys Phe Met Val Leu Leu Arg Lys Asp  
 1475                    1480                    1485  
  
 Ser Ser Glu Gln His His Ile Asn Val Lys Ile Ser Glu Ile Asp Ile  
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 Asp Met Phe Pro Lys Asp Asp Asn Val Thr Val Lys Val Asn Glu Met  
 1505                    1510                    1515                    1520  
  
 Glu Ile Pro Pro Ala Cys Leu Thr Ala Thr Gln Gln Leu Pro Leu  
 1525                    1530                    1535  
  
 Lys Ile Lys Thr Lys Arg Arg Gly Leu Ala Val Tyr Ala Pro Ser His  
 1540                    1545                    1550  
  
 Gly Leu Gln Glu Val Tyr Phe Asp Arg Lys Thr Trp Arg Ile Lys Val  
 1555                    1560                    1565  
  
 Ala Asp Trp Met Lys Gly Lys Thr Cys Gly Leu Cys Gly Lys Ala Asp  
 1570                    1575                    1580  
  
 Gly Glu Ile Arg Gln Glu Tyr His Thr Pro Asn Gly Arg Val Ala Lys  
 1585                    1590                    1595                    1600  
  
 Asn Ser Ile Ser Phe Ala His Ser Trp Ile Leu Pro Ala Glu Ser Cys  
 1605                    1610                    1615  
  
 Arg Asp Ala Ser Glu Cys Arg Leu Lys Leu Glu Ser Val Gln Leu Glu  
 1620                    1625                    1630  
  
 Lys Gln Leu Thr Ile His Gly Glu Asp Ser Thr Cys Phe Ser Val Glu  
 1635                    1640                    1645  
  
 Pro Val Pro Arg Cys Leu Pro Gly Cys Leu Pro Val Lys Thr Thr Pro  
 1650                    1655                    1660

Val	Thr	Val	Gly	Phe	Ser	Cys	Leu	Ala	Ser	Asp	Pro	Gln	Thr	Ser	Val
1665				1670						1675					1680
Tyr	Asp	Arg	Ser	Val	Asp	Leu	Arg	Gln	Thr	Thr	Gln	Ala	His	Leu	Ala
				1685				1690						1695	
Cys	Ser	Cys	Asn	Thr	Lys	Cys	Ser								
				1700											

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<212> PRT  
<213> *Acipenser transmontanus*

<220>  
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precursor

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<223> lipovitellin II

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Phe	Ser	Gly	Ser	Lys	Thr	Tyr	Gln	Tyr	Lys	Tyr	Glu	Gly	Val	Ile	Leu
				20				25						30	

Thr	Gly	Leu	Pro	Glu	Lys	Gly	Leu	Ala	Arg	Ala	Gly	Leu	Lys	Val	His
				35				40					45		

Cys	Lys	Val	Glu	Ile	Ser	Glu	Val	Ala	Gln	Lys	Thr	Tyr	Leu	Leu	Lys
				50				55					60		

Ile	Leu	Asn	Pro	Glu	Ile	Gln	Glu	Tyr	Asn	Gly	Ile	Trp	Pro	Lys	Ala
				65				70				75		80	

Pro Phe Tyr Pro Ala Ser Lys Leu Thr Gln Ala Leu Ala Ser Gln Leu  
                   85                     90                     95  
  
 Thr Gln Pro Ile Lys Phe Gln Tyr Arg Asn Gly Gln Val Gly Asp Ile  
                   100                    105                    110  
  
 Phe Ala Ser Glu Asp Val Ser Asp Thr Val Leu Asn Ile Gln Arg Gly  
                   115                    120                    125  
  
 Ile Leu Asn Met Leu Gln Leu Thr Ile Lys Thr Thr Gln Asn Val Tyr  
                   130                    135                    140  
  
 Gly Leu Gln Glu Asn Gly Ile Ala Gly Ile Cys Glu Ala Ser Tyr Val  
                   145                    150                    155                    160  
  
 Ile Gln Glu Asp Arg Lys Ala Asn Lys Ile Ile Val Thr Lys Ser Lys  
                   165                    170                    175  
  
 Asp Leu Asn Asn Cys Asn Glu Lys Ile Lys Met Asp Ile Gly Met Ala  
                   180                    185                    190  
  
 Tyr Ser His Thr Cys Ser Asn Cys Arg Lys Ile Arg Lys Asn Thr Arg  
                   195                    200                    205  
  
 Gly Thr Ala Ala Tyr Thr Tyr Ile Leu Lys Pro Thr Asp Thr Gly Thr  
                   210                    215                    220  
  
 Leu Ile Thr Gln Ala Thr Ser Gln Glu Val His Gln Leu Thr Pro Phe  
                   225                    230                    235                    240  
  
 Asn Glu Met Thr Gly Ala Ala Ile Thr Glu Ala Arg Gln Lys Leu Val  
                   245                    250                    255  
  
 Leu Glu Asp Ala Lys Val Ile His Val Thr Val Pro Glu Gln Glu Leu  
                   260                    265                    270  
  
 Lys Asn Arg Gly Ser Ile Gln Tyr Gln Phe Ala Ser Glu Ile Leu Gln  
                   275                    280                    285  
  
 Thr Pro Ile Gln Leu Phe Lys Thr Arg Ser Pro Glu Thr Lys Ile Lys  
                   290                    295                    300  
  
 Glu Val Leu Gln His Leu Val Gln Asn Asn Gln Gln Val Gln Ser  
                   305                    310                    315                    320  
  
 Asp Ala Pro Ser Lys Phe Leu Gln Leu Thr Gln Leu Leu Arg Ala Cys  
                   325                    330                    335  
  
 Thr His Glu Asn Ile Glu Gly Ile Trp Arg Gln Tyr Glu Lys Thr Gln  
                   340                    345                    350  
  
 Leu Tyr Arg Arg Trp Ile Leu Asp Ala Leu Pro Ala Ala Ala Thr Pro  
                   355                    360                    365  
  
 Thr Ala Phe Arg Phe Ile Thr Gln Arg Ile Met Lys Arg Asp Leu Thr  
                   370                    375                    380  
  
 Asp Ala Glu Ala Ile Gln Thr Leu Val Thr Ala Met His Leu Val Gln  
                   385                    390                    395                    400

Thr Asn His Gln Ile Val Gln Met Ala Ala Glu Leu Val Phe Asp Arg  
                   405                  410                  415  
  
 Ala Asn Leu Lys Cys Pro Val Leu Arg Lys His Ala Val Leu Ala Tyr  
                   420                  425                  430  
  
 Gly Ser Met Val Asn Arg Tyr Cys Ala Glu Thr Leu Asn Cys Arg Glu  
                   435                  440                  445  
  
 Glu Ala Leu Lys Pro Leu His Asp Phe Ala Asn Asp Ala Ile Ser Arg  
                   450                  455                  460  
  
 Ala His Glu Glu Glu Thr Val Leu Ala Leu Lys Ala Leu Gly Asn Ala  
                   465                  470                  475                  480  
  
 Gly Gln Pro Ser Ser Ile Lys Arg Ile Gln Lys Cys Leu Pro Gly Phe  
                   485                  490                  495  
  
 Ser Ser Gly Ala Ser Gln Leu Pro Val Lys Ile Gln Val Asp Ala Val  
                   500                  505                  510  
  
 Met Ala Leu Arg Asn Ile Ala Lys Lys Glu Pro Gly Lys Val Gln Glu  
                   515                  520                  525  
  
 Leu Thr Met Gln Leu Phe Met Asp His Gln Leu His Ser Glu Val Arg  
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 Met Val Ala Ser Met Val Leu Leu Glu Thr Arg Pro Ser Met Ala Leu  
                   545                  550                  555                  560  
  
 Val Ala Thr Leu Ala Glu Ala Leu Leu Lys Glu Thr Ser Leu Gln Val  
                   565                  570                  575  
  
 Ala Ser Phe Thr Tyr Ser His Met Lys Ala Ile Thr Arg Ser Thr Ala  
                   580                  585                  590  
  
 Pro Glu Asn His Ala Leu Ser Ser Ala Cys Asn Val Ala Val Lys Leu  
                   595                  600                  605  
  
 Leu Ser Arg Lys Leu Asp Arg Leu Ser Tyr Arg Tyr Ser Lys Ala Met  
                   610                  615                  620  
  
 His Met Asp Thr Phe Lys Tyr Pro Leu Met Ala Gly Ala Ala Ala Asn  
                   625                  630                  635                  640  
  
 Ile His Ile Ile Asn Asn Ala Ala Ser Ile Leu Pro Ser Ala Val Val  
                   645                  650                  655  
  
 Met Lys Phe Gln Ala Tyr Ile Leu Ser Ala Thr Ala Asp Pro Leu Glu  
                   660                  665                  670  
  
 Ile Gly Leu His Thr Glu Gly Leu Gln Glu Val Leu Met Gln Asn His  
                   675                  680                  685  
  
 Glu His Ile Asp Gln Met Pro Ser Ala Gly Lys Ile Gln Gln Ile Met  
                   690                  695                  700  
  
 Lys Met Leu Ser Gly Trp Lys Ser Val Pro Ser Glu Lys Thr Leu Ala  
                   705                  710                  715                  720

Ser Ala Tyr Ile Lys Leu Phe Gly Gln Glu Ile Ser Phe Ser Arg Leu  
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Asp Lys Lys Thr Ile Gln Glu Ala Leu Gln Ala Val Arg Glu Pro Val  
 740 745 750

Glu Arg Gln Thr Val Ile Lys Arg Val Val Asn Gln Leu Glu Arg Gly  
 755 760 765

Ala Ala Ala Gln Leu Ser Lys Pro Leu Leu Val Ala Glu Val Arg Arg  
 770 775 780

Ile Leu Pro Thr Cys Ile Gly Leu Pro Met Glu Met Ser Leu Tyr Val  
 785 790 795 800

Ser Ala Val Thr Thr Ala Asp Ile Asn Val Gln Ala His Ile Thr Pro  
 805 810 815

Ser Pro Thr Asn Asp Phe Asn Val Ala Gln Leu Leu Asn Ser Asn Ile  
 820 825 830

Val Leu His Thr Asp Val Thr Pro Ser Ile Ala Met His Thr Ile Ala  
 835 840 845

Val Met Gly Ile Asn Thr His Val Ile Gln Thr Gly Val Glu Leu His  
 850 855 860

Val Lys Ala Arg Thr Thr Val Pro Met Lys Phe Thr Ala Lys Ile Asp  
 865 870 875 880

Leu Lys Glu Lys Asn Phe Lys Ile Glu Ser Glu Pro Cys Gln Gln Glu  
 885 890 895

Thr Glu Val Leu Ser Leu Ser Ala Gln Ala Phe Ala Ile Ser Arg Asn  
 900 905 910

Val Glu Asp Leu Asp Ala Ala Lys Lys Asn Pro Leu Leu Pro Glu Glu  
 915 920 925

Ala Val Arg Asn Ile Leu Asn Glu Gln Phe Asn Ser Gly Thr Glu Asp  
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Ser Asn Glu Arg Glu Arg Ala Gly Lys Phe Ala Arg Pro Ser Ala Glu  
 945 950 955 960

Met Met Ser Gln Glu Leu Met Asn Ser Gly Glu His Gln Asn Arg Lys  
 965 970 975

Gly Ala His Ala Thr Arg Ser Ala Cys Ala Lys Ala Asn Phe Gly  
 980 985 990

Phe Glu Val Cys Phe Glu Gly Lys Ser Glu Asn Val Ala Phe Leu Arg  
 995 1000 1005

Asp Ser Pro Leu Tyr Lys Ile Ile Gly Gln His His Cys Lys Ile Ala  
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Leu Lys Pro Ser His Ser Ser Glu Ala Thr Ile Glu Lys Ile Gln Leu  
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Glu Leu Gln Thr Gly Asn Lys Ala Ala Ser Lys Ile Ile Arg Val Val  
                   1045                  1050                  1055  
  
 Ala Met Gln Ser Leu Ala Glu Ala Asp Glu Met Lys Gly Asn Ile Leu  
                   1060                  1065                  1070  
  
 Lys Lys Leu Asn Lys Leu Leu Thr Val Asp Gly Glu Thr Gln Asp Ser  
                   1075                  1080                  1085  
  
 Thr Leu Arg Gly Phe Lys Arg Arg Ser Ser Ser Ser Ser Ser Ser Ser  
                   1090                  1095                  1100  
  
 Ser Gln  
                   1105                  1110                  1115                  1120  
  
 Gln Ser Arg Met Glu Lys Arg Met Glu Gln Asp Lys Leu Thr Glu Asn  
                   1125                  1130                  1135  
  
 Leu Glu Arg Asp Arg Asp His Met Arg Gly Lys Gln Ser Lys Asn Lys  
                   1140                  1145                  1150  
  
 Lys Gln Glu Trp Lys Asn Lys Gln Lys Lys His His Lys Gln Leu Pro  
                   1155                  1160                  1165  
  
 Ser  
                   1170                  1175                  1180  
  
 Ser Ser Ser Ser Ser Ser Ser Ser Ser Arg Ser His Asn His  
                   1185                  1190                  1195                  1200  
  
 Arg Asn Asn Thr Arg Thr Leu Ser Lys Ser Lys Arg Tyr Gln Asn Asn  
                   1205                  1210                  1215  
  
 Asn Asn Ser Ser Ser Ser Ser Gly Ser Ser Ser Ser Glu Glu Ile  
                   1220                  1225                  1230  
  
 Gln Lys Asn Pro Glu Ile Phe Ala Tyr Arg Phe Arg Ser His Arg Asp  
                   1235                  1240                  1245  
  
 Lys Leu Gly Phe Gln Asn Lys Arg Gly Arg Met Ser Ser Ser Ser Ser  
                   1250                  1255                  1260  
  
 Ser Ser Ser Ser Ser Ser Gln Ser Thr Leu Asn Ser Lys Gln Asp  
                   1265                  1270                  1275                  1280  
  
 Ala Lys Phe Leu Gly Asp Ser Ser Pro Pro Ile Phe Ala Phe Val Ala  
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 Arg Ala Val Arg Ser Asp Gly Leu Gln Gln Gly Tyr Gln Val Ala Ala  
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 Tyr Thr Asp Asn Arg Val Ser Arg Pro Arg Val Gln Leu Leu Ala Thr  
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 Glu Ile Ile Glu Lys Ser Arg Trp Gln Ile Cys Ala Asp Ala Ile Leu  
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 Ala Ser Asn Tyr Lys Ala Met Ala Leu Met Arg Trp Gly Glu Glu Cys  
                   1345                  1350                  1355                  1360

Gln Asp Tyr Lys Val Ala Val Ser Ala Val Thr Gly Arg Leu Ala Ser  
                   1365                  1370                  1375  
  
 His Pro Ser Leu Gln Ile Lys Ala Lys Trp Ser Arg Ile Pro Arg Ala  
                   1380                  1385                  1390  
  
 Ala Lys Gln Thr Gln Asn Ile Leu Ala Glu Tyr Val Pro Gly Ala Ala  
                   1395                  1400                  1405  
  
 Phe Met Leu Gly Phe Ser Gln Lys Glu Gln Arg Asn Pro Ser Lys Gln  
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 Phe Lys Ile Ile Leu Ala Val Thr Ser Pro Asn Thr Ile Asp Thr Leu  
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 Ile Lys Ala Pro Lys Ile Thr Leu Phe Lys Gln Ala Val Gln Ile Pro  
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 Val Gln Ile Pro Met Glu Pro Ser Asp Ala Glu Arg Arg Ser Pro Gly  
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 Leu Ala Ser Ile Met Asn Glu Ile Pro Phe Leu Ile Glu Glu Ala Thr  
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 Lys Ser Lys Cys Val Ala Gln Glu Asn Lys Phe Ile Thr Phe Asp Gly  
                   1490                  1495                  1500  
  
 Val Lys Phe Ser Tyr Gln Met Pro Gly Gly Cys Tyr His Ile Leu Ala  
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 Gln Asp Cys Arg Ser Lys Val Arg Phe Met Val Met Leu Lys Gln Ala  
                   1525                  1530                  1535  
  
 Ser Met Ser Lys Asn Leu Arg Ala Val Asn Ala Lys Ile Tyr Asn Lys  
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 Asp Ile Asp Ile Leu Pro Thr Thr Lys Gly Ser Val Arg Leu Leu Ile  
                   1555                  1560                  1565  
  
 Asn Asn Asn Glu Ile Pro Leu Ser Gln Leu Pro Phe Thr Asp Ser Ser  
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 Gly Asn Ile His Ile Lys Arg Ala Asp Glu Gly Val Ser Val Ser Ala  
                   1585                  1590                  1595                  1600  
  
 Gln Gln Tyr Gly Leu Glu Ser Leu Tyr Phe Asp Gly Lys Thr Val Gln  
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 Val Lys Val Thr Ser Glu Met Arg Gly Lys Thr Cys Gly Leu Cys Gly  
                   1620                  1625                  1630  
  
 His Asn Asp Gly Glu Arg Arg Lys Glu Phe Arg Met Pro Asp Gly Arg  
                   1635                  1640                  1645  
  
 Gln Ala Arg Gly Pro Ser Val Ser Pro Thr Pro Gly Leu Cys Leu Glu  
                   1650                  1655                  1660  
  
 Lys Thr Ala Thr Glu Ala Ala Ser Phe Cys Val Ile Met  
                   1665                  1670                  1675

<210> 18  
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 <223> African clawed frog vitellogenin

<400> 18  
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   1               5   10               15

Arg Thr His Ile Glu Pro Val Phe Ser Glu Ser Lys Ile Ser Val Tyr  
   20   25   30

Asn Tyr Glu Ala Val Ile Leu Asn Gly Phe Pro Glu Ser Gly Leu Ser  
   35   40   45

Arg Ala Gly Ile Lys Ile Asn Cys Lys Val Glu Ile Ser Ala Tyr Ala  
   50   55   60

Gln Arg Ser Tyr Phe Leu Lys Ile Gln Ser Pro Glu Ile Lys Glu Tyr  
   65   70   75   80

Asn Gly Val Trp Pro Lys Asp Pro Phe Thr Arg Ser Ser Lys Leu Thr  
   85   90   95

Gln Ala Leu Ala Glu Gln Leu Thr Lys Pro Ala Arg Phe Glu Tyr Ser  
   100   105   110

Asn Gly Arg Val Gly Asp Ile Phe Val Ala Asp Asp Val Ser Asp Thr  
   115   120   125

Val Ala Asn Ile Tyr Arg Gly Ile Leu Asn Leu Leu Gln Val Thr Ile  
   130   135   140

Lys Lys Ser Gln Asp Val Tyr Asp Leu Gln Glu Ser Ser Val Gly Gly  
   145   150   155   160

Ile Cys His Thr Arg Tyr Val Ile Gln Glu Asp Lys Arg Gly Asp Gln  
   165   170   175

Ile Arg Ile Ile Lys Ser Thr Asp Phe Asn Asn Cys Gln Asp Lys Val  
   180   185   190

Ser Lys Thr Ile Gly Leu Glu Leu Ala Glu Phe Cys His Ser Cys Lys  
   195   200   205

Gln Leu Asn Arg Val Ile Gln Gly Ala Ala Thr Tyr Thr Tyr Lys Leu  
   210   215   220

Lys Gly Arg Asp Gln Gly Thr Val Ile Met Glu Val Thr Ala Arg Gln  
   225   230   235   240

Val Leu Gln Val Thr Pro Phe Ala Glu Arg His Gly Ala Ala Thr Met  
   245   250   255

Glu Ser Arg Gln Val Leu Ala Trp Val Gly Ser Lys Ser Gly Gln Leu  
   260   265   270

Thr Pro Pro Gln Ile Gln Leu Lys Asn Arg Gly Asn Leu His Tyr Gln  
 275 280 285

Phe Ala Ser Glu Leu His Gln Met Pro Ile His Leu Met Lys Thr Lys  
 290 295 300

Ser Pro Glu Ala Gln Ala Val Glu Val Leu Gln His Leu Val Gln Asp  
 305 310 315 320

Thr Gln Gln His Ile Arg Glu Asp Ala Pro Ala Lys Phe Leu Gln Leu  
 325 330 335

Val Gln Leu Leu Arg Ala Ser Asn Phe Glu Asn Leu Gln Ala Leu Trp  
 340 345 350

Lys Gln Phe Ala Gln Arg Thr Gln Tyr Arg Arg Cys Leu Leu Asp Ala  
 355 360 365

Leu Pro Met Ala Gly Thr Val Asp Cys Leu Lys Phe Ile Lys Gln Leu  
 370 375 380

Ile His Asn Glu Glu Leu Thr Thr Gln Glu Ala Ala Val Leu Ile Thr  
 385 390 395 400

Phe Ala Met Arg Ser Ala Arg Pro Gly Gln Arg Asn Phe Gln Ile Ser  
 405 410 415

Ala Asp Leu Val Gln Asp Ser Lys Val Gln Lys Tyr Ser Thr Val His  
 420 425 430

Lys Ala Ala Ile Leu Ala Tyr Gly Thr Met Val Arg Arg Tyr Cys Asp  
 435 440 445

Gln Leu Ser Ser Cys Pro Glu His Ala Leu Glu Pro Leu His Glu Leu  
 450 455 460

Ala Ala Glu Ala Ala Asn Lys Gly His Tyr Glu Asp Ile Ala Leu Ala  
 465 470 475 480

Leu Lys Ala Leu Gly Asn Ala Gly Gln Pro Glu Ser Ile Lys Arg Ile  
 485 490 495

Gln Lys Phe Leu Pro Gly Phe Ser Ser Ser Ala Asp Gln Leu Pro Val  
 500 505 510

Arg Ile Gln Thr Asp Ala Val Met Ala Leu Arg Asn Ile Ala Lys Glu  
 515 520 525

Asp Pro Arg Lys Val Gln Glu Ile Leu Leu Gln Ile Phe Met Asp Arg  
 530 535 540

Asp Val Arg Thr Glu Val Arg Met Met Ala Cys Leu Ala Leu Phe Glu  
 545 550 555 560

Thr Arg Pro Gly Leu Ala Thr Val Thr Ala Ile Ala Asn Val Ala Ala  
 565 570 575

Arg Glu Ser Lys Thr Asn Leu Gln Leu Ala Ser Phe Thr Phe Ser Gln  
 580 585 590

Met Lys Ala Leu Ser Lys Ser Ser Val Pro His Leu Glu Pro Leu Ala  
595 600 605

Ala Ala Cys Ser Val Ala Leu Lys Ile Leu Asn Pro Ser Leu Asp Asn  
610 615 620

Leu Gly Tyr Arg Tyr Ser Lys Val Met Arg Val Asp Thr Phe Lys Tyr  
625 630 635 640

Asn Leu Met Ala Gly Ala Ala Lys Val Phe Ile Met Asn Ser Ala  
645 650 655

Asn Thr Met Phe Pro Val Phe Ile Leu Ala Lys Phe Arg Glu Tyr Thr  
660 665 670

Ser Leu Val Glu Asn Asp Asp Ile Glu Ile Gly Ile Arg Gly Glu Gly  
675 680 685

Ile Glu Glu Phe Leu Arg Lys Gln Asn Ile Gln Phe Ala Asn Phe Pro  
690 695 700

Met Arg Lys Lys Ile Ser Gln Ile Val Lys Ser Leu Leu Gly Phe Lys  
705 710 715 720

Gly Leu Pro Ser Gln Val Pro Leu Ile Ser Gly Tyr Ile Lys Leu Phe  
725 730 735

Gly Gln Glu Ile Ala Phe Thr Glu Leu Asn Lys Glu Val Ile Gln Asn  
740 745 750

Thr Ile Gln Ala Leu Asn Gln Pro Ala Glu Arg His Thr Met Ile Arg  
755 760 765

Asn Val Leu Asn Lys Leu Leu Asn Gly Val Val Gly Gln Tyr Ala Arg  
770 775 780

Arg Trp Met Thr Trp Glu Tyr Arg His Ile Ile Pro Thr Thr Val Gly  
785 790 795 800

Leu Pro Ala Glu Leu Ser Leu Tyr Gln Ser Ala Ile Val His Ala Ala  
805 810 815

Val Asn Ser Asp Val Lys Val Lys Pro Thr Pro Ser Gly Asp Phe Ser  
820 825 830

Ala Ala Gln Leu Leu Glu Ser Gln Ile Gln Leu Asn Gly Glu Val Lys  
835 840 845

Pro Ser Val Leu Val His Thr Val Ala Thr Met Gly Ile Asn Ser Pro  
850 855 860

Leu Phe Gln Ala Gly Ile Glu Phe His Gly Lys Val His Ala His Leu  
865 870 875 880

Pro Ala Lys Phe Thr Ala Phe Leu Asp Met Lys Asp Arg Asn Phe Lys  
885 890 895

Ile Glu Thr Pro Pro Phe Gln Gln Glu Asn His Leu Val Glu Ile Arg  
900 905 910

Ala Gln Thr Phe Ala Phe Thr Arg Asn Ile Ala Asp Leu Asp Ser Ala  
915 920 925

Arg Lys Thr Leu Val Val Pro Arg Asn Asn Glu Gln Asn Ile Leu Lys  
930 935 940

Lys His Phe Glu Thr Thr Gly Arg Thr Ser Ala Glu Gly Ala Ser Met  
945 950 955 960

Met Glu Asp Ser Ser Glu Met Gly Pro Lys Lys Tyr Ser Ala Glu Pro  
965 970 975

Gly His His Gln Tyr Ala Pro Asn Ile Asn Ser Tyr Asp Ala Cys Thr  
980 985 990

Lys Phe Ser Lys Ala Gly Val His Leu Cys Ile Gln Cys Lys Thr His  
995 1000 1005

Asn Ala Ala Ser Arg Arg Asn Thr Ile Phe Tyr Gln Ala Val Gly Glu  
1010 1015 1020

His Asp Phe Lys Leu Thr Met Lys Pro Ala His Thr Glu Gly Ala Ile  
1025 1030 1035 1040

Glu Lys Leu Gln Leu Glu Ile Thr Ala Gly Pro Lys Ala Ala Ser Lys  
1045 1050 1055

Ile Met Gly Leu Val Glu Val Glu Gly Thr Glu Gly Glu Pro Met Asp  
1060 1065 1070

Glu Thr Ala Val Thr Lys Arg Leu Lys Met Ile Leu Gly Ile Asp Glu  
1075 1080 1085

Ser Arg Lys Asp Thr Asn Glu Thr Ala Leu Tyr Arg Ser Lys Gln Lys  
1090 1095 1100

Lys Lys Asn Lys Ile His Asn Arg Arg Leu Asp Ala Glu Val Val Glu  
1105 1110 1115 1120

Ala Arg Lys Gln Gln Ser Ser Leu Ser Ser Ser Ser Ser Ser Ser  
1125 1130 1135

Ser  
1140 1145 1150

Ser Pro Ser Ser Ser Ser Ser Ser Tyr Ser Lys Arg Ser Lys Arg  
1155 1160 1165

Arg Glu His Asn Pro His His Gln Arg Glu Ser Ser Ser Ser Ser  
1170 1175 1180

Gln Glu Gln Asn Lys Lys Arg Asn Leu Gln Glu Asn Arg Lys His Gly  
1185 1190 1195 1200

Gln Lys Gly Met Ser  
1205 1210 1215

Ser  
1220 1225 1230

Glu Glu Asn Arg Pro His Lys Asn Arg Gln His Asp Asn Lys Gln Ala  
 1235 1240 1245  
  
 Lys Met Gln Ser Asn Gln His Gln Gln Lys Lys Asn Lys Phe Ser Glu  
 1250 1255 1260  
  
 Ser Ser Ser Ser Ser Ser Ser Ser Glu Met Trp Asn Lys  
 1265 1270 1275 1280  
  
 Lys Lys His His Arg Asn Phe Tyr Asp Leu Asn Phe Arg Arg Thr Ala  
 1285 1290 1295  
  
 Arg Thr Lys Gly Thr Glu His Arg Gly Ser Arg Leu Ser Ser Ser Ser  
 1300 1305 1310  
  
 Glu Ser Ser Ser Ser Ser Glu Ser Ala Tyr Arg His Lys Ala Lys  
 1315 1320 1325  
  
 Phe Leu Gly Asp Lys Glu Pro Pro Val Leu Val Val Thr Phe Lys Ala  
 1330 1335 1340  
  
 Val Arg Asn Asp Asn Thr Lys Gln Gly Tyr Gln Met Val Val Tyr Gln  
 1345 1350 1355 1360  
  
 Glu Tyr His Ser Ser Lys Gln Gln Ile Gln Ala Tyr Val Met Asp Ile  
 1365 1370 1375  
  
 Ser Lys Thr Arg Trp Ala Ala Cys Phe Asp Ala Val Val Val Asn Pro  
 1380 1385 1390  
  
 His Glu Ala Gln Ala Ser Leu Lys Trp Gly Gln Asn Cys Gln Asp Tyr  
 1395 1400 1405  
  
 Lys Ile Asn Met Lys Ala Glu Thr Gly Asn Phe Gly Asn Gln Pro Ala  
 1410 1415 1420  
  
 Leu Arg Val Thr Ala Asn Trp Pro Lys Ile Pro Ser Lys Trp Lys Ser  
 1425 1430 1435 1440  
  
 Thr Gly Lys Val Val Gly Glu Tyr Val Pro Gly Ala Met Tyr Met Met  
 1445 1450 1455  
  
 Gly Phe Gln Gly Glu Tyr Lys Arg Asn Ser Gln Arg Gln Val Lys Leu  
 1460 1465 1470  
  
 Val Phe Ala Leu Ser Ser Pro Arg Thr Cys Asp Val Val Ile Arg Ile  
 1475 1480 1485  
  
 Pro Arg Leu Thr Val Tyr Tyr Arg Ala Leu Arg Leu Pro Val Pro Ile  
 1490 1495 1500  
  
 Pro Val Gly His His Ala Lys Glu Asn Val Leu Gln Thr Pro Thr Trp  
 1505 1510 1515 1520  
  
 Asn Ile Phe Ala Glu Ala Pro Lys Leu Ile Met Asp Ser Ile Gln Gly  
 1525 1530 1535  
  
 Glu Cys Lys Val Ala Gln Asp Gln Ile Thr Thr Phe Asn Gly Val Asp  
 1540 1545 1550

Leu Ala Ser Ala Leu Pro Glu Asn Cys Tyr Asn Val Leu Ala Gln Asp  
     1555                         1560                         1565  
  
 Cys Ser Pro Glu Met Lys Phe Met Val Leu Met Arg Asn Ser Lys Glu  
     1570                         1575                         1580  
  
 Ser Pro Asn His Lys Asp Ile Asn Val Lys Leu Gly Glu Tyr Asp Ile  
     1585                         1590                         1595                         1600  
  
 Asp Met Tyr Tyr Ser Ala Asp Ala Phe Lys Met Lys Ile Asn Asn Leu  
     1605                         1610                         1615  
  
 Glu Val Ser Glu Glu His Leu Pro Tyr Lys Ser Phe Asn Tyr Pro Thr  
     1620                         1625                         1630  
  
 Val Glu Ile Lys Lys Gly Asn Gly Val Ser Leu Ser Ala Ser Glu  
     1635                         1640                         1645  
  
 Tyr Gly Ile Asp Ser Leu Asp Tyr Asp Gly Leu Thr Phe Lys Phe Arg  
     1650                         1655                         1660  
  
 Pro Thr Ile Trp Met Lys Gly Lys Thr Cys Gly Ile Cys Gly His Asn  
     1665                         1670                         1675                         1680  
  
 Asp Asp Glu Ser Glu Lys Glu Leu Gln Met Pro Asp Gly Ser Val Ala  
     1685                         1690                         1695  
  
 Lys Asp Gln Met Arg Phe Ile His Ser Trp Ile Leu Pro Ala Glu Ser  
     1700                         1705                         1710  
  
 Cys Ser Glu Gly Cys Asn Leu Lys His Thr Leu Val Lys Leu Glu Lys  
     1715                         1720                         1725  
  
 Ala Ile Ala Thr Asp Gly Ala Lys Ala Lys Cys Tyr Ser Val Gln Pro  
     1730                         1735                         1740  
  
 Val Leu Arg Cys Ala Lys Gly Cys Ser Pro Val Lys Thr Val Glu Val  
     1745                         1750                         1755                         1760  
  
 Ser Thr Gly Phe His Cys Leu Pro Ser Asp Val Ser Leu Asp Leu Pro  
     1765                         1770                         1775  
  
 Glu Gly Gln Ile Arg Leu Glu Lys Ser Glu Asp Phe Ser Glu Lys Val  
     1780                         1785                         1790  
  
 Glu Ala His Thr Ala Cys Ser Cys Glu Thr Ser Pro Cys Ala Ala  
     1795                         1800                         1805  
  
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<212> PRT  
<213> Gallus gallus  
  
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<223> chicken vitellogenin  
  
<400> 19  
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     1                             5                             10                         15

Lys Phe Asp Ile Asp Pro Gly Phe Asn Ser Arg Arg Ser Tyr Leu Tyr  
                   20                  25                  30

Asn Tyr Glu Gly Ser Met Leu Asn Gly Leu Gln Asp Arg Ser Leu Gly  
                   35                  40                  45

Lys Ala Gly Val Arg Leu Ser Ser Lys Leu Glu Ile Ser Gly Leu Pro  
                   50                  55                  60

Glu Asn Ala Tyr Leu Leu Lys Val Arg Ser Pro Gln Val Glu Glu Tyr  
                   65                  70                  75                  80

Asn Gly Val Trp Pro Arg Asp Pro Phe Thr Arg Ser Ser Lys Ile Thr  
                   85                  90                  95

Gln Val Ile Ser Ser Cys Phe Thr Arg Leu Phe Lys Phe Glu Tyr Ser  
                   100                  105                  110

Ser Gly Arg Ile Gly Asn Ile Tyr Ala Pro Glu Asp Cys Pro Asp Leu  
                   115                  120                  125

Cys Val Asn Ile Val Arg Gly Ile Leu Asn Met Phe Gln Met Thr Ile  
                   130                  135                  140

Lys Lys Ser Gln Asn Val Tyr Glu Leu Gln Glu Ala Gly Ile Gly Gly  
                   145                  150                  155                  160

Ile Cys His Ala Arg Tyr Val Ile Gln Glu Asp Arg Lys Asn Ser Arg  
                   165                  170                  175

Ile Tyr Val Thr Arg Thr Val Asp Leu Asn Asn Cys Gln Glu Lys Val  
                   180                  185                  190

Gln Lys Ser Ile Gly Met Ala Tyr Ile Tyr Pro Cys Pro Val Asp Val  
                   195                  200                  205

Met Lys Glu Arg Leu Thr Lys Gly Thr Thr Ala Phe Ser Tyr Lys Leu  
                   210                  215                  220

Lys Gln Ser Asp Ser Gly Thr Leu Ile Thr Asp Val Ser Ser Arg Gln  
                   225                  230                  235                  240

Val Tyr Gln Ile Ser Pro Phe Asn Glu Pro Thr Gly Val Ala Val Met  
                   245                  250                  255

Glu Ala Arg Gln Gln Leu Thr Leu Val Glu Val Arg Ser Glu Arg Gly  
                   260                  265                  270

Ser Ala Pro Asp Val Pro Met Gln Asn Tyr Gly Ser Leu Arg Tyr Arg  
                   275                  280                  285

Phe Pro Ala Val Leu Pro Gln Met Pro Leu Gln Leu Ile Lys Thr Lys  
                   290                  295                  300

Asn Pro Glu Gln Arg Ile Val Glu Thr Leu Gln His Ile Val Leu Asn  
                   305                  310                  315                  320

Asn Gln Gln Asp Phe His Asp Asp Val Ser Tyr Arg Phe Leu Glu Val  
                   325                  330                  335

Val Gln Leu Cys Arg Ile Ala Asn Ala Asp Asn Leu Glu Ser Ile Trp  
           340                     345                     350  
  
 Arg Gln Val Ser Asp Lys Pro Arg Tyr Arg Arg Trp Leu Leu Ser Ala  
           355                     360                     365  
  
 Val Ser Ala Ser Gly Thr Thr Glu Thr Leu Lys Phe Leu Lys Asn Arg  
           370                     375                     380  
  
 Ile Arg Asn Asp Asp Leu Asn Tyr Ile Gln Thr Leu Leu Thr Val Ser  
           385                     390                     395                     400  
  
 Leu Thr Leu His Leu Leu Gln Ala Asp Glu His Thr Leu Pro Ile Ala  
           405                     410                     415  
  
 Ala Asp Leu Met Thr Ser Ser Arg Ile Gln Lys Asn Pro Val Leu Gln  
           420                     425                     430  
  
 Gln Val Ala Cys Leu Gly Tyr Ser Ser Val Val Asn Arg Tyr Cys Ser  
           435                     440                     445  
  
 Gln Thr Ser Ala Cys Pro Lys Glu Ala Leu Gln Pro Ile His Asp Leu  
           450                     455                     460  
  
 Ala Asp Glu Ala Ile Ser Arg Gly Arg Glu Asp Lys Met Lys Leu Ala  
           465                     470                     475                     480  
  
 Leu Lys Cys Ile Gly Asn Met Gly Glu Pro Ala Ser Leu Lys Arg Ile  
           485                     490                     495  
  
 Leu Lys Phe Leu Pro Ile Ser Ser Ser Ala Ala Asp Ile Pro Val  
           500                     505                     510  
  
 His Ile Gln Ile Asp Ala Ile Thr Ala Leu Lys Lys Ile Ala Trp Lys  
           515                     520                     525  
  
 Asp Pro Lys Thr Val Gln Gly Tyr Leu Ile Gln Ile Leu Ala Asp Gln  
           530                     535                     540  
  
 Ser Leu Pro Pro Glu Val Arg Met Met Ala Cys Ala Val Ile Phe Glu  
           545                     550                     555                     560  
  
 Thr Arg Pro Ala Leu Ala Leu Ile Thr Thr Ile Ala Asn Val Ala Met  
           565                     570                     575  
  
 Lys Glu Ser Lys Thr Asn Met Gln Val Ala Ser Phe Val Tyr Ser His  
           580                     585                     590  
  
 Met Lys Ser Leu Ser Lys Ser Arg Leu Pro Phe Met Tyr Asn Ile Ser  
           595                     600                     605  
  
 Ser Ala Cys Asn Ile Ala Leu Lys Leu Leu Ser Pro Lys Leu Asp Ser  
           610                     615                     620  
  
 Met Ser Tyr Arg Tyr Ser Lys Val Ile Arg Ala Asp Thr Tyr Phe Asp  
           625                     630                     635                     640  
  
 Asn Tyr Arg Val Gly Ala Thr Gly Glu Ile Phe Val Val Asn Ser Pro  
           645                     650                     655

Arg Thr Met Phe Pro Ser Ala Ile Ile Ser Lys Leu Met Ala Asn Ser  
               660                         665                         670  
  
 Ala Gly Ser Val Ala Asp Leu Val Glu Val Gly Ile Arg Val Glu Gly  
               675                         680                         685  
  
 Leu Ala Asp Val Ile Met Lys Arg Asn Ile Pro Phe Ala Glu Tyr Pro  
               690                         695                         700  
  
 Thr Tyr Lys Gln Ile Lys Glu Leu Gly Lys Ala Leu Gln Gly Trp Lys  
               705                         710                         715                         720  
  
 Glu Leu Pro Thr Glu Thr Pro Leu Val Ser Ala Tyr Leu Lys Ile Leu  
               725                         730                         735  
  
 Gly Gln Glu Val Ala Phe Ile Asn Ile Asn Lys Glu Leu Leu Gln Gln  
               740                         745                         750  
  
 Val Met Lys Thr Val Val Glu Pro Ala Asp Arg Asn Ala Ala Ile Lys  
               755                         760                         765  
  
 Arg Ile Ala Asn Gln Ile Leu Asn Ser Ile Ala Gly Gln Trp Thr Gln  
               770                         775                         780  
  
 Pro Val Trp Met Gly Glu Leu Arg Tyr Val Val Pro Ser Cys Leu Gly  
               785                         790                         795                         800  
  
 Leu Pro Leu Glu Tyr Gly Ser Tyr Thr Thr Ala Leu Ala Arg Ala Ala  
               805                         810                         815  
  
 Val Ser Val Glu Gly Lys Met Thr Pro Pro Leu Thr Gly Asp Phe Arg  
               820                         825                         830  
  
 Leu Ser Gln Leu Leu Glu Ser Thr Met Gln Ile Arg Ser Asp Leu Lys  
               835                         840                         845  
  
 Pro Ser Leu Tyr Val His Thr Val Ala Thr Met Gly Val Asn Thr Glu  
               850                         855                         860  
  
 Tyr Phe Gln His Ala Val Glu Ile Gln Gly Glu Val Gln Thr Arg Met  
               865                         870                         875                         880  
  
 Pro Met Lys Phe Asp Ala Lys Ile Asp Val Lys Leu Lys Asn Leu Lys  
               885                         890                         895  
  
 Ile Glu Thr Asn Pro Cys Arg Glu Glu Thr Glu Ile Val Val Gly Arg  
               900                         905                         910  
  
 His Lys Ala Phe Ala Val Ser Arg Asn Ile Gly Glu Leu Gly Val Glu  
               915                         920                         925  
  
 Lys Arg Thr Ser Ile Leu Pro Glu Asp Ala Pro Leu Asp Val Thr Glu  
               930                         935                         940  
  
 Glu Pro Phe Gln Thr Ser Glu Arg Ala Ser Arg Glu His Phe Ala Met  
               945                         950                         955                         960  
  
 Gln Gly Pro Asp Ser Met Pro Arg Lys Gln Ser His Ser Ser Arg Glu  
               965                         970                         975

Asp Leu Arg Arg Ser Thr Gly Lys Arg Ala His Lys Arg Asp Ile Cys  
 980 985 990  
 Leu Lys Met His His Ile Gly Cys Gln Leu Cys Phe Ser Arg Arg Ser  
 995 1000 1005  
 Arg Asp Ala Ser Phe Ile Gln Asn Thr Tyr Leu His Lys Leu Ile Gly  
 1010 1015 1020  
 Glu His Glu Ala Lys Ile Val Leu Met Pro Val His Thr Asp Ala Asp  
 1025 1030 1035 1040  
 Ile Asp Lys Ile Gln Leu Glu Ile Gln Ala Gly Ser Arg Ala Ala  
 1045 1050 1055  
 Arg Ile Ile Thr Glu Val Asn Pro Glu Ser Glu Glu Asp Glu Ser  
 1060 1065 1070  
 Ser Pro Tyr Glu Asp Ile Gln Ala Lys Leu Lys Arg Ile Leu Gly Ile  
 1075 1080 1085  
 Asp Ser Met Phe Lys Val Ala Asn Lys Thr Arg His Pro Lys Asn Arg  
 1090 1095 1100  
 Pro Ser Lys Lys Gly Asn Thr Val Leu Ala Glu Phe Gly Thr Glu Pro  
 1105 1110 1115 1120  
 Asp Ala Lys Thr Ser Ser Ser Ser Ala Ser Ser Thr Ala Thr  
 1125 1130 1135  
 Ser Ser Ala Ser Ser Ser Ala Ser Ser Pro Asn Arg Lys Lys Pro Met  
 1140 1145 1150  
 Asp Glu Glu Glu Asn Asp Gln Val Lys Gln Ala Arg Asn Lys Asp Ala  
 1155 1160 1165  
 Ser Ser Ser Ser Arg Ser Ser Lys Ser Ser Asn Ser Ser Lys Arg Ser  
 1170 1175 1180  
 Ser Ser Lys Ser Ser Asn Ser Ser Lys Arg Ser Ser Ser Ser Ser  
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 Ser Arg Ser Arg Ser Ser Ser Lys Ser Ser Ser Ser Ser Ser  
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 Ser Ser Ser Ser Ser Ser Lys Ser Ser Ser Ser Arg Ser Ser Ser  
 1250 1255 1260  
 Ser Ser Lys Ser Ser Ser His His Ser His His His Ser Gly His  
 1265 1270 1275 1280  
 Leu Asn Gly Ser Ser Ser Ser Ser Ser Arg Ser Val Ser His  
 1285 1290 1295

His Ser His Glu His His Ser Gly His Leu Glu Asp Asp Ser Ser Ser  
 1300 1305 1310

Ser Ser Ser Ser Val Leu Ser Lys Ile Trp Gly Arg His Glu Ile  
 1315 1320 1325

Tyr Gln Tyr Arg Phe Arg Ser Ala His Arg Gln Glu Phe Pro Lys Arg  
 1330 1335 1340

Lys Leu Pro Gly Asp Arg Ala Thr Ser Arg Tyr Ser Ser Thr Arg Ser  
 1345 1350 1355 1360

Ser His Asp Thr Ser Arg Ala Ala Ser Trp Pro Lys Phe Leu Gly Asp  
 1365 1370 1375

Ile Lys Thr Pro Val Leu Ala Ala Phe Leu His Gly Ile Ser Asn Asn  
 1380 1385 1390

Lys Lys Thr Gly Gly Leu Gln Leu Val Val Tyr Ala Asp Thr Asp Ser  
 1395 1400 1405

Val Arg Pro Arg Val Gln Val Phe Val Thr Asn Leu Thr Asp Ser Ser  
 1410 1415 1420

Lys Trp Lys Leu Cys Ala Asp Ala Ser Val Arg Asn Ala Pro Gln Ala  
 1425 1430 1435 1440

Val Ala Tyr Val Lys Trp Gly Trp Asp Cys Arg Asp Tyr Lys Val Ser  
 1445 1450 1455

Thr Glu Leu Val Thr Gly Arg Phe Ala Gly His Pro Ala Ala Gln Val  
 1460 1465 1470

Lys Leu Glu Trp Pro Lys Val Pro Ser Asn Val Arg Ser Val Val Glu  
 1475 1480 1485

Trp Phe Tyr Glu Phe Val Pro Gly Ala Ala Phe Met Leu Gly Phe Ser  
 1490 1495 1500

Glu Arg Met Asp Lys Asn Pro Ser Arg Gln Ala Arg Met Val Val Ala  
 1505 1510 1515 1520

Leu Thr Ser Pro Arg Thr Cys Asp Val Val Val Lys Leu Pro Asp Ile  
 1525 1530 1535

Ile Leu Tyr Gln Lys Ala Val Arg Leu Pro Leu Ser Leu Pro Val Gly  
 1540 1545 1550

Pro Arg Ile Pro Ala Ser Glu Leu Gln Pro Pro Ile Trp Asn Val Phe  
 1555 1560 1565

Ala Glu Ala Pro Ser Ala Val Leu Glu Asn Leu Lys Ala Arg Cys Ser  
 1570 1575 1580

Val Ser Tyr Asn Lys Ile Lys Thr Phe Asn Glu Val Lys Phe Asn Tyr  
 1585 1590 1595 1600

Ser Met Pro Ala Asn Cys Tyr His Ile Leu Val Gln Asp Cys Ser Ser  
 1605 1610 1615

Glu Leu Lys Phe Leu Val Met Met Lys Ser Ala Gly Glu Ala Thr Asn  
                  1620                     1625                     1630  
  
 Leu Lys Ala Ile Asn Ile Lys Ile Gly Ser His Glu Ile Asp Met His  
                  1635                     1640                     1645  
  
 Pro Val Asn Gly Gln Val Lys Leu Leu Val Asp Gly Ala Glu Ser Pro  
                  1650                     1655                     1660  
  
 Thr Ala Asn Ile Ser Leu Ile Ser Ala Gly Ala Ser Leu Trp Ile His  
                  1665                     1670                     1675                 1680  
  
 Asn Glu Asn Gln Gly Phe Ala Leu Ala Ala Pro Gly His Gly Ile Asp  
                  1685                     1690                     1695  
  
 Lys Leu Tyr Phe Asp Gly Lys Thr Ile Thr Ile Gln Val Pro Leu Trp  
                  1700                     1705                     1710  
  
 Met Ala Gly Lys Thr Cys Gly Ile Cys Gly Lys Tyr Asp Ala Glu Cys  
                  1715                     1720                     1725  
  
 Glu Gln Glu Tyr Arg Met Pro Asn Gly Tyr Leu Ala Lys Asn Ala Val  
                  1730                     1735                     1740  
  
 Ser Phe Gly His Ser Trp Ile Leu Glu Ala Pro Cys Arg Gly Ala  
                  1745                     1750                     1755                 1760  
  
 Cys Lys Leu His Arg Ser Phe Val Lys Leu Glu Lys Thr Val Gln Leu  
                  1765                     1770                     1775  
  
 Ala Gly Val Asp Ser Lys Cys Tyr Ser Thr Glu Pro Val Leu Arg Cys  
                  1780                     1785                     1790  
  
 Ala Lys Gly Cys Ser Ala Thr Lys Thr Thr Pro Val Thr Val Gly Phe  
                  1795                     1800                     1805  
  
 His Cys Leu Pro Ala Asp Ser Ala Asn Ser Leu Thr Asp Lys Gln Met  
                  1810                     1815                     1820  
  
 Lys Tyr Asp Gln Lys Ser Glu Asp Met Gln Asp Thr Val Asp Ala His  
                  1825                     1830                     1835                 1840  
  
 Thr Thr Cys Ser Cys Glu Asn Glu Glu Cys Ser Thr  
                  1845                     1850

<210> 20  
 <211> 1823  
 <212> PRT  
 <213> Ichthyomyzon unicuspis

<220>  
 <223> lamprey vitellogenin precursor  
  
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 <221> SIGNAL  
 <222> (1)...(14)  
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<220>
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<222> (15)..(1823)
<223> mature chain

<220>
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<223> lipovitellin LV-1N

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<223> lipovitellin LV-2

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Met Trp Lys Leu Leu Leu Val Ala Leu Ala Phe Ala Leu Ala Asp Ala
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Gln Phe Gln Pro Gly Lys Val Tyr Arg Tyr Ser Tyr Asp Ala Phe Ser
      20          25          30

Ile Ser Gly Leu Pro Glu Pro Gly Val Asn Arg Ala Gly Leu Ser Gly
      35          40          45

Glu Met Lys Ile Glu Ile His Gly His Thr His Asn Gln Ala Thr Leu
      50          55          60

Lys Ile Thr Gln Val Asn Leu Lys Tyr Phe Leu Gly Pro Trp Pro Ser
      65          70          75          80

Asp Ser Phe Tyr Pro Leu Thr Ala Gly Tyr Asp His Phe Ile Gln Gln
      85          90          95

Leu Glu Val Pro Val Arg Phe Asp Tyr Ser Ala Gly Arg Ile Gly Asp
      100         105         110

Ile Tyr Ala Pro Pro Gln Val Thr Asp Thr Ala Val Asn Ile Val Arg
      115         120         125

Gly Ile Leu Asn Leu Phe Gln Leu Ser Leu Lys Lys Asn Gln Gln Thr
      130         135         140

Phe Glu Leu Gln Glu Thr Gly Val Glu Gly Ile Cys Gln Thr Thr Tyr
      145         150         155         160

Val Val Gln Glu Gly Tyr Arg Thr Asn Glu Met Ala Val Val Lys Thr
      165         170         175

Lys Asp Leu Asn Asn Cys Asp His Lys Val Tyr Lys Thr Met Gly Thr
      180         185         190

Ala Tyr Ala Glu Arg Cys Pro Thr Cys Gln Lys Met Asn Lys Asn Leu
      195         200         205

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Arg Ser Thr Ala Val Tyr Asn Tyr Ala Ile Phe Asp Glu Pro Ser Gly  
 210 215 220  
 Tyr Ile Ile Lys Ser Ala His Ser Glu Glu Ile Gln Gln Leu Ser Val  
 225 230 235 240  
 Phe Asp Ile Lys Glu Gly Asn Val Val Ile Glu Ser Arg Gln Lys Leu  
 245 250 255  
 Ile Leu Glu Gly Ile Gln Ser Ala Pro Ala Ala Ser Gln Ala Ala Ser  
 260 265 270  
 Leu Gln Asn Arg Gly Leu Met Tyr Lys Phe Pro Ser Ser Ala Ile  
 275 280 285  
 Thr Lys Met Ser Ser Leu Phe Val Thr Lys Gly Lys Asn Leu Glu Ser  
 290 295 300  
 Glu Ile His Thr Val Leu Lys His Leu Val Glu Asn Asn Gln Leu Ser  
 305 310 315 320  
 Val His Glu Asp Ala Pro Ala Lys Phe Leu Arg Leu Thr Ala Phe Leu  
 325 330 335  
 Arg Asn Val Asp Ala Gly Val Leu Gln Ser Ile Trp His Lys Leu His  
 340 345 350  
 Gln Gln Lys Asp Tyr Arg Arg Trp Ile Leu Asp Ala Val Pro Ala Met  
 355 360 365  
 Ala Thr Ser Glu Ala Leu Leu Phe Leu Lys Arg Thr Leu Ala Ser Glu  
 370 375 380  
 Gln Leu Thr Ser Ala Glu Ala Thr Gln Ile Val Tyr Ser Thr Leu Ser  
 385 390 395 400  
 Asn Gln Gln Ala Thr Arg Glu Ser Leu Ser Tyr Ala Arg Glu Leu Leu  
 405 410 415  
 His Thr Ser Phe Ile Arg Asn Arg Pro Ile Leu Arg Lys Thr Ala Val  
 420 425 430  
 Leu Gly Tyr Gly Ser Leu Val Phe Arg Tyr Cys Ala Asn Thr Val Ser  
 435 440 445  
 Cys Pro Asp Glu Leu Leu Gln Pro Leu His Asp Leu Leu Ser Gln Ser  
 450 455 460  
 Ser Asp Arg Ala Asp Glu Glu Glu Ile Val Leu Ala Leu Lys Ala Leu  
 465 470 475 480  
 Gly Asn Ala Gly Gln Pro Asn Ser Ile Lys Lys Ile Gln Arg Phe Leu  
 485 490 495  
 Pro Gly Gln Gly Lys Ser Leu Asp Glu Tyr Ser Thr Arg Val Gln Ala  
 500 505 510  
 Glu Ala Ile Met Ala Leu Arg Asn Ile Ala Lys Arg Asp Pro Arg Lys  
 515 520 525

Val Gln Glu Ile Val Leu Pro Ile Phe Leu Asn Val Ala Ile Lys Ser  
 530 535 540

Glu Leu Arg Ile Arg Ser Cys Ile Val Phe Phe Glu Ser Lys Pro Ser  
 545 550 555 560

Val Ala Leu Val Ser Met Val Ala Val Arg Leu Arg Arg Glu Pro Asn  
 565 570 575

Leu Gln Val Ala Ser Phe Val Tyr Ser Gln Met Arg Ser Leu Ser Arg  
 580 585 590

Ser Ser Asn Pro Glu Phe Arg Asp Val Ala Ala Ala Cys Ser Val Ala  
 595 600 605

Ile Lys Met Leu Gly Ser Lys Leu Asp Arg Leu Gly Cys Arg Tyr Ser  
 610 615 620

Lys Ala Val His Val Asp Thr Phe Asn Ala Arg Thr Met Ala Gly Val  
 625 630 635 640

Ser Ala Asp Tyr Phe Arg Ile Asn Ser Pro Ser Gly Pro Leu Pro Arg  
 645 650 655

Ala Val Ala Ala Lys Ile Arg Gly Gln Gly Met Gly Tyr Ala Ser Asp  
 660 665 670

Ile Val Glu Phe Gly Leu Arg Ala Glu Gly Leu Gln Glu Leu Leu Tyr  
 675 680 685

Arg Gly Ser Gln Glu Gln Asp Ala Tyr Gly Thr Ala Leu Asp Arg Gln  
 690 695 700

Thr Leu Leu Arg Ser Gly Gln Ala Arg Ser His Val Ser Ser Ile His  
 705 710 715 720

Asp Thr Leu Arg Lys Leu Ser Asp Trp Lys Ser Val Pro Glu Glu Arg  
 725 730 735

Pro Leu Ala Ser Gly Tyr Val Lys Val His Gly Gln Glu Val Val Phe  
 740 745 750

Ala Glu Leu Asp Lys Lys Met Met Gln Arg Ile Ser Gln Leu Trp His  
 755 760 765

Ser Ala Arg Ser His His Ala Ala Ala Gln Glu Gln Ile Arg Ala Val  
 770 775 780

Val Ser Lys Leu Glu Gln Gly Met Asp Val Leu Leu Thr Lys Gly Tyr  
 785 790 795 800

Val Val Ser Glu Val Arg Tyr Met Gln Pro Val Cys Ile Gly Ile Pro  
 805 810 815

Met Asp Leu Asn Leu Leu Val Ser Gly Val Thr Thr Asn Arg Ala Asn  
 820 825 830

Leu His Ala Ser Phe Ser Gln Ser Leu Pro Ala Asp Met Lys Leu Ala  
 835 840 845

Asp Leu Leu Ala Thr Asn Ile Glu Leu Arg Val Ala Ala Thr Thr Ser  
 850 855 860

Met Ser Gln His Ala Val Ala Ile Met Gly Leu Thr Thr Asp Leu Ala  
 865 870 875 880

Lys Ala Gly Met Gln Thr His Tyr Lys Thr Ser Ala Gly Leu Gly Val  
 885 890 895

Asn Gly Lys Ile Glu Met Asn Ala Arg Glu Ser Asn Phe Lys Ala Ser  
 900 905 910

Leu Lys Pro Phe Gln Gln Lys Thr Val Val Val Leu Ser Thr Met Glu  
 915 920 925

Ser Ile Val Phe Val Arg Asp Pro Ser Gly Ser Arg Ile Leu Pro Val  
 930 935 940

Leu Pro Pro Lys Met Thr Leu Asp Lys Gly Leu Ile Ser Gln Gln  
 945 950 955 960

Gln Gln Pro His His Gln Gln Gln Pro His Gln His Gly Gln Asp Gln  
 965 970 975

Ala Arg Ala Ala Tyr Gln Arg Pro Trp Ala Ser His Glu Phe Ser Pro  
 980 985 990

Ala Glu Gln Lys Gln Ile His Asp Ile Met Thr Ala Arg Pro Val Met  
 995 1000 1005

Arg Arg Lys Gln His Cys Ser Lys Ser Ala Ala Leu Ser Ser Lys Val  
 1010 1015 1020

Cys Phe Ser Ala Arg Leu Arg Asn Ala Ala Phe Ile Arg Asn Ala Leu  
 1025 1030 1035 1040

Leu Tyr Lys Ile Thr Gly Asp Tyr Val Ser Lys Val Tyr Val Gln Pro  
 1045 1050 1055

Thr Ser Ser Lys Ala Gln Ile Gln Lys Val Glu Leu Glu Leu Gln Ala  
 1060 1065 1070

Gly Pro Gln Ala Ala Glu Lys Val Ile Arg Met Val Glu Leu Val Ala  
 1075 1080 1085

Lys Ala Ser Lys Lys Ser Lys Lys Asn Ser Thr Ile Thr Glu Glu Gly  
 1090 1095 1100

Val Gly Glu Thr Ile Ile Ser Gln Leu Lys Lys Ile Leu Ser Ser Asp  
 1105 1110 1115 1120

Lys Asp Lys Asp Ala Lys Lys Pro Pro Gly Ser Ser Ser Ser Ser Ser  
 1125 1130 1135

Ser Asp Lys Ser Gly  
 1140 1145 1150

Lys Lys Thr Pro Arg Gln Gly Ser Thr Val Asn Leu Ala Ala Lys Arg  
 1155 1160 1165

Ala Ser Lys Lys Gln Arg Gly Lys Asp Ser Ser Ser Ser Ser Ser  
 1170 1175 1180

Ser Ser Ser Ser Ser Asp Ser Ser Lys Ser Pro His Lys His Gly Gly  
 1185 1190 1195 1200

Ala Lys Arg Gln His Ala Gly His Ala Pro His Leu Gly Pro Gln  
 1205 1210 1215

Ser His Ser  
 1220 1225 1230

Ala Ser Lys Ser Phe Ser Thr Val Lys Pro Pro Met Thr Arg Lys Pro  
 1235 1240 1245

Arg Pro Ala Arg Ser Ser Ser Ser Ser Ser Ser Asp Ser Ser Ser  
 1250 1255 1260

Ser  
 1265 1270 1275 1280

Ser Ser Ser Glu Ser Lys Ser Leu Glu Trp Leu Ala Val Lys Asp  
 1285 1290 1295

Val Asn Gln Ser Ala Phe Tyr Asn Phe Lys Tyr Val Pro Gln Arg Lys  
 1300 1305 1310

Pro Gln Thr Ser Arg Arg His Thr Pro Ala Ser Ser Ser Ser Ser Ser  
 1315 1320 1325

Ser Asp Ser Asp  
 1330 1335 1340

Met Thr Val Ser Ala Glu Ser Phe Glu Lys His Ser Lys Pro Lys Val  
 1345 1350 1355 1360

Val Ile Val Leu Arg Ala Val Arg Ala Asp Gly Lys Gln Gln Gly Leu  
 1365 1370 1375

Gln Thr Thr Leu Tyr Tyr Gly Leu Thr Ser Asn Gly Leu Pro Lys Ala  
 1380 1385 1390

Lys Ile Val Ala Val Glu Leu Ser Asp Leu Ser Val Trp Lys Leu Cys  
 1395 1400 1405

Ala Lys Phe Arg Leu Ser Ala His Met Lys Ala Lys Ala Ala Ile Gly  
 1410 1415 1420

Trp Gly Lys Asn Cys Gln Gln Tyr Arg Ala Met Leu Glu Ala Ser Thr  
 1425 1430 1435 1440

Gly Asn Leu Gln Ser His Pro Ala Ala Arg Val Asp Ile Lys Trp Gly  
 1445 1450 1455

Arg Leu Pro Ser Ser Leu Gln Arg Ala Lys Asn Ala Leu Leu Glu Asn  
 1460 1465 1470

Lys Ala Pro Val Ile Ala Ser Lys Leu Glu Met Glu Ile Met Pro Lys  
 1475 1480 1485

Lys Asn Gln Lys His Gln Val Ser Val Ile Leu Ala Ala Met Thr Pro  
1490 1495 1500

Arg Arg Met Asn Ile Ile Val Lys Leu Pro Lys Val Thr Tyr Phe Gln  
1505 1510 1515 1520

Gln Gly Ile Leu Leu Pro Phe Thr Phe Pro Ser Pro Arg Phe Trp Asp  
1525 1530 1535

Arg Pro Glu Gly Ser Gln Ser Asp Ser Leu Pro Ala Gln Ile Ala Ser  
1540 1545 1550

Ala Phe Ser Gly Ile Val Gln Asp Pro Val Ala Ser Ala Cys Glu Leu  
1555 1560 1565

Asn Glu Gln Ser Leu Thr Thr Phe Asn Gly Ala Phe Phe Asn Tyr Asp  
1570 1575 1580

Met Pro Glu Ser Cys Tyr His Val Leu Ala Gln Glu Cys Ser Ser Arg  
1585 1590 1595 1600

Pro Pro Phe Ile Val Leu Ile Lys Leu Asp Ser Glu Arg Arg Ile Ser  
1605 1610 1615

Leu Glu Leu Gln Leu Asp Asp Lys Lys Val Lys Ile Val Ser Arg Asn  
1620 1625 1630

Asp Ile Arg Val Asp Gly Glu Lys Val Pro Leu Arg Arg Leu Ser Gln  
1635 1640 1645

Lys Asn Gln Tyr Gly Phe Leu Val Leu Asp Ala Gly Val His Leu Leu  
1650 1655 1660

Leu Lys Tyr Lys Asp Leu Arg Val Ser Phe Asn Ser Ser Val Gln  
1665 1670 1675 1680

Val Trp Val Pro Ser Ser Leu Lys Gly Gln Thr Cys Gly Leu Cys Gly  
1685 1690 1695

Arg Asn Asp Asp Glu Leu Val Thr Glu Met Arg Met Pro Asn Leu Glu  
1700 1705 1710

Val Ala Lys Asp Phe Thr Ser Phe Ala His Ser Trp Ile Ala Pro Asp  
1715 1720 1725

Glu Thr Cys Gly Gly Ala Cys Ala Leu Ser Arg Gln Thr Val His Lys  
1730 1735 1740

Glu Ser Thr Ser Val Ile Ser Gly Ser Arg Glu Asn Cys Tyr Ser Thr  
1745 1750 1755 1760

Glu Pro Ile Met Arg Cys Pro Ala Thr Cys Ser Ala Ser Arg Ser Val  
1765 1770 1775

Pro Val Ser Val Ala Met His Cys Leu Pro Ala Glu Ser Glu Ala Ile  
1780 1785 1790

Ser Leu Ala Met Ser Glu Gly Arg Pro Phe Ser Leu Ser Gly Lys Ser  
1795 1800 1805

Glu Asp Leu Val Thr Glu Met Glu Ala His Val Ser Cys Val Ala  
1810 1815 1820

<210> 21  
<211> 30  
<212> DNA  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence:PCR mutagenesis primer to introduce ApaI restriction site

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ccatgggccc agcacactga ggagtgcagc 30

<210> 22  
<211> 43  
<212> DNA  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence:mutation primer to create SpeI restriction site and new internal start codon

<400> 22  
tcttgctgtg gctctactag tgatggacca gtccaaacttg gcc 43

<210> 23  
<211> 43  
<212> DNA  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence:mutation primer to create SpeI restriction site and new internal start codon

<400> 23  
ccaagttgga ctggtccatc actagtagag ccacagcaag agc 43

<210> 24  
<211> 6  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence:6xHis C-terminal tag

<400> 24  
His His His His His His  
1 5